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1937-38 & 1939-40

Annual Report of the Department of Agriculture in the Province of Bombay, 1937-38

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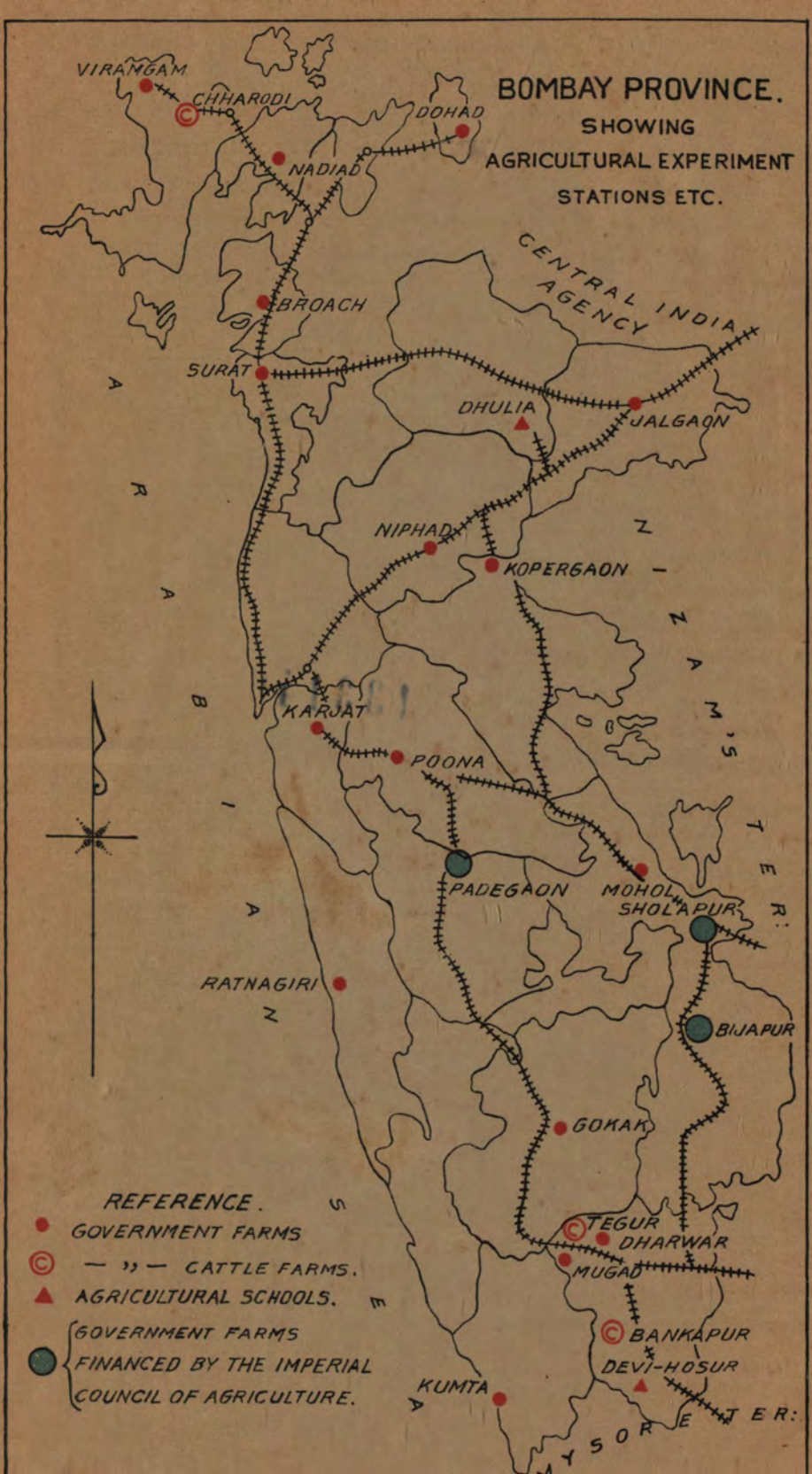
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— " — CATTLE FARMS.
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ANNUAL REPORT OF THE DEPARTMENT OF AGRICULTURE, BOMBAY PROVINCE, 1937-38.

CHAPTER I.

FEATURES OF THE YEAR.

Climate and Rainfall.

(1) The agricultural season of 1937–38 may, in general, be considered to have been fair over a large part of the Province except in the eastern parts of the South Deccan and the Karnatak where it was rather disappointing particularly when it was a second bad season in succession. However, the yield of grain crops was satisfactory in the North Deccan and the Konkan. There were ample rains over most of the Province during the season under review but their distribution was uneven, both as regards periodicity of fall and area. The rainfall was continuous and heavy towards the end of June, in July and September, but there was a prolonged break of about five weeks in August and the first week of September. The *kharif* season was thus characterised by irregular rainfall which had the effect of reducing the yield of crops. The opportune rains in September and October considerably relieved the situation and improved the general stand of crops in many cases saving them from withering. These rains were also excellent for the *rabi* cultivation and encouraged *rabi* sowings and gave hopes of a good *rabi* season; but unfortunately, the failure of later rains and the unusual mildness of the winter falsified these hopes. Besides the adverse rainfall, there were other adverse factors such as the prevalence of dry easterly winds, occurrence of cold wave and attacks of insect pests and plant diseases which affected unfavourably the yields of late crops which fell short of expectations. A large block of the country in the south of the Deccan and almost the whole of the Karnatak had deficient and very badly distributed rainfall almost throughout the season and both the *kharif* and *rabi* crops in these areas were poor.

(2) The tabulated statement, given hereunder, compares the actual acreage shown under food-grain crops in the different divisions of the Province and the estimated tonnage outturn during the year under report, i.e., 1937–38, and the previous year, i.e., 1936–37:—

Division.	Area in thousands of acres.		Estimated outturn in thousands of tons.	
	1936–37.	1937–38.	1936–37.	1937–38.
	Acres.	Acres.	Tons.	Tons.
Gujarat	2,126	2,453	485	692
North Deccan	3,807	3,714	714	748
South Deccan	7,412	7,532	1,091	1,000
Karnatak	4,995	4,867	780	631
Konkan	1,605	1,615	605	678
Total for Bombay Province ..	19,945	20,181	3,675	3,749

The table indicates that the yield of food crops has been fairly satisfactory in Gujarat, the North Deccan and the Konkan. The unfavourable character of the season in the southern parts of the Deccan is reflected in the drop in the estimated outturn notwithstanding a slight increase in the total area sown. The reduction in yield in the case of the Karnatak was due partly to the decrease in area and partly to the unsatisfactory nature of the season in the division.

(3) Reference to the statement given below will show that, taking all crops together, there has been little alteration in the total area sown during the preceding four years. The area under food-grains and cotton showed a little improvement over the last year while the area under groundnut exhibited a considerable increase and reached the record figure of

1,344,000 acres during the year under report which exceeded the highest figure of 1933–34 :—

Year.	Area (in thousands of acres) sown with different crops in the Bombay Province.			
	Food-grain crops, i.e., cereals and pulses.	Cotton.	Groundnut.	All crops.
	Acres.	Acres.	Acres.	Acres.
1933–34	19,792	3,655	1,292	29,181
1934–35	20,149	3,657	682	26,039
1935–36	19,847	4,163	891	29,373
1936–37	19,945	3,714	987	29,171
1937–38	20,181	3,862	1,344	29,684

(4) The slight signs of improvement in the prices of food and cash crops that were visible last year were unfortunately not maintained but on the contrary the prices of export crops had considerably fallen, the fall in cotton prices being most visible as could be seen from the statement given below :—

Prices prevailing at harvest time for agricultural produce (in seers of 80 tolas per rupee), except for cotton, which are recorded in rupees per khandi of 784 lbs.

Year.	Food crops.			Export crops.		
	Jowar (Sholapur).	Bajri (Nasik.)	Rice (Thana).	Wheat (Ahmedabad).	Broach cotton (Bombay).	Groundnut (Karad).
	Seers.	Seers.	Seers.	Seers.	Rs.	Seers.
1933–34 ..	20	12	9	11	207	17
1934–35 ..	15	11	9	11	261	18
1935–36 ..	21	13	8	8	207	13
1936–37 ..	16	11	7	7	234	10
1937–38 ..	17	11	9	10	168	14

(5) The actual fluctuations in cotton prices can be seen from the following statement which gives the prices in rupees per *khandi* (784 lbs.) of Broach cotton at Bombay during the year under report :—

Month 1937.	Price in rupees.	Month 1938.	Price in rupees.
August	191	January	160
September	176	February	183
October	154	March	174
November	149	April	165
December	157	May	158
		June	149
		July	155

Sugar Prices.

(6) As in previous years, the prices of Indian and Java sugar have been given for comparison. Similarly, average *gul* rates for the months of March, April and May in Poona are given in a separate statement :—

Statement showing prices of sugar (Indian and Java) from August 1937 to July 1938.

Month.	Prices of sugar at Bombay per cwt.	
	Indian.	Java.*
1937.	Rs. a. p.	Rs. a. p.
August	8 14 10	*Nil.*
September	8 15 9	*Nil.*
October	9 5 5	15 4 8
November	9 8 5	15 7 6
December	9 9 6	15 9 5
1938.		
January	9 8 3	15 8 0
February	10 3 8	15 4 3
March	10 5 11	15 6 9
April	10 5 2	15 1 0
May	10 6 3	15 2 0
June	10 9 7	15 2 0
July	10 13 4	15 4 0

*Java sugar had not actually arrived in Bombay during these months and the prices were only *nominal*.

Statement giving average gul rates for the months of March, April and May.

Year.	Price of gul per *palla* of 250 lbs.	Area of cane in the Deccan.
	Rs.	Acres.
1931	15·66	40,238
1932	15·33	42,389
1933	10·79	45,592
1934	14·06	43,418
1935	18·59	47,832
1936	12·00	54,760
1937	10·75	56,632
1938	14·87	48,005

The increase in the prices of *gul* is due to the fact that the condition of sugarcane in the United Provinces and Bihar was not good as the crop suffered very badly from "Pyrilla" insects and consequently the yield was reduced, secondly, the total area of sugarcane in the Deccan, during the year under report, was reduced by about 15 per cent. as compared with the preceding year and the old stock of *gul* was also much below the normal.

Summary of Main Features of the work of the Agricultural Department during the year.

(7) *District activities.*—During the year under report, the district activities of the Agricultural Department in connection with demonstration and propaganda, seed distribution, land improvement, crop protection, etc., continued to develop in almost every district of the Province. A special feature of the year was that Government gave a special grant of Rs. 40,000 for training large number of cultivators in scientific bunding operations. As reported last year, great interest was being taken by cultivators in simple but scientific methods of constructing field bunds and embankments to protect the cultivated fields from permanent damage and loss by soil erosion and washings, but the special grant of Rs. 40,000 made by Government for training as many as 1,800 cultivators in the three southern agricultural divisions of the Province gave splendid opportunity to bring home to a large number of

cultivators the urgent necessity of doing the bunding work on scientific lines.

As many as 8 classes, each lasting for a fortnight, were held in the three agricultural divisions—(four in South-Central, two in North-Central and two in Southern Division) for training as many as 815 cultivators in the science and art of bunding their fields. These classes serve as the best type of propaganda. These classes showed that scientific knowledge of bunding can be so simplified as to be brought within the reach and capacity of an ordinary cultivator. Cultivators who attended these classes were also convinced that the methods they used to follow were very defective and wasteful and they wished that some selected men who can read and write should be given higher training to deal with complicated problems of soil erosion and it has been decided to train up fifteen cultivators from each of the three tracts for three months at Poona under the Professor of Agricultural Engineering so that their services might be available to the cultivators of their tracts at a nominal cash payment under the guidance of the bunding staff of the Department of Agriculture.

During the year, 4,503 acres were protected by simple bunds in the North-Central Division, whilst between the South-Central Division and the Karnatak 112 minor bunding projects were framed and carried out, protecting 2,718 acres of land.

The extension of the improved varieties of crops in the districts is another aspect of departmental activity which is being pushed on very intensively in an organized manner. In Khandesh, as reported last year, the scheme for multiplication and extension of "Jarilá" cotton was brought into operation during the year with the help of the Indian Central Cotton Committee and as much as 525 acres have been grown under this cotton for multiplication of seed under Departmental control. In the Karnatak due to bad season there was a slight set-back in the area actually sown under Jayawant and Gadag No. 1 cottons, there being a shortage of 63,000 acres in the area of 4 lakhs of acres mentioned in the last year's report but during the year seed of the above mentioned two cottons sufficient for about 4½ lakhs and 1½ lakhs of acres, respectively, will be made available. The system of auction sales is getting more popular and has been of great help in increasing the supply of pure seed and for ensuring better prices for the growers. In Gujarat, 1027, A.L.F. and B.D. 8 cottons are being continued to be distributed in spite of many

difficulties. The cotton policy of the Surat tract is getting settled down to the idea of allowing pure seed of selection IA to the Olpad tract under proper legislative control, the rest of the Surat and Ankleshwar area being put under 1027, A.L.F. at least for three years with a view to compare the intrinsic worth of both the cottons under controlled purity.

It is hoped this will help to maintain the reputation of Surat cotton by growing 1027, A.L.F., the best cotton so far known, over a major part of the Surat area. Under this policy Co-operative Societies in Olpad have been given pure seed of IA for multiplication and further distribution in that area. B.D. 8 cotton grown in Broach was in good demand and fetched a premium of Rs. 44 to 54 per candy. As a result of this, the seed was also in good demand and if the demand from the Mills for this fine cotton at a good premium continues, there will be no difficulty in extending the area under B.D. 8 cotton. The Indian Central Cotton Committee has recently sanctioned the extension of the seed scheme for the spread of B.D. 8 cotton.

Among other crops, rice and wheat are important. In the Southern Division, there was a set-back in the extension of improved varieties of rice and the area went down to 18,000 acres from 24,000 acres due to unfavourable season. K 42 and K 540 are popular in Kolaba and Thana, respectively. Also K 540 and other varieties of Kolamba are finding place in Satara and Ahmednagar.

As regards wheat, there has been a steady progress in the extension of improved wheat Nos. 224 and 168. The area under these two wheats shows an increase of 15,500 acres over last year, No. 168 being specially popular. Further details of the extension of improved varieties of crops are given in this Report and its appendices.

The dry farming methods on Mohol Farm and at Bijapur have again given better results over cultivator's methods but the close study of the problem will show that the success of dry farming method will depend upon the effective control of weeds, prevention of erosion and washing, conservation of moisture, wider sowing and maintenance of soil fertility by various methods within the reach of the cultivator to give best economic results.

The organization of gun clubs for the protection of cultivators' crops from damages by wild animals was continued and one lakh of acres in the Southern Division and 40,000 acres in East Khandesh were protected.

In Kanara, the campaign of spraying betelnut palms with Bordeaux mixture was carried on as last year.

Work of conserving village manure supply by improving manure pits and by making compost was steadily pushed on particularly in Khandesh and Karnatak.

In connection with livestock improvement, the sheep breeding farm financed by the Imperial Council of Agricultural Research has been started at Poona and 10 ewes and 5 rams of the Merino sheep of Wangenalla strain were obtained from South Africa and 41 Deccan ewes and one ram were selected from the Deccan.

Government has also constituted the Provincial Fodder and Grazing Committee consisting of 10 official and 6 non-official members to examine and advise on all matters connected with the use and improvement of grazing, grass and fodders.

(8) *Research Activities.*—As a result of scientific investigations carried out for evolving wilt resistant types of cotton, the Plant Pathologist to Government has succeeded in isolating 100 per cent. wilt resistant types of B.D. 8, back cross of (B.D. 8 × G.A. 26) × B.D. 8., and N.S. 12, New Million Dollar and of Chinese R 1 Spotless.

The new Assistant Plant Pathologist, working at Sirsi on the Koleroga disease of betelnut, has discovered the fungus perennates as dormant myceleum in the dead crown of the areca nut trees. The Plant Pathologist has obtained very promising results in controlling the *mottle-leaf* disease of Mosambi and *powdery mildew* of betel-vines. The dry farming stations at Sholapur and Bijapur are investigating the practical methods of applying the scientific methods of dry farming to give economic results. The Sugarcane Research Station, Padegaon, is working out the application of soil classification, crop nutrition, etc., to the problems of sugarcane cultivation under Deccan Canals. During the year, the results worked out on various Government Farms and the Agricultural College are being demonstrated on some fifty newly started Demonstration Centre farms of private cultivators under the close guidance of the staff of the Department. Two demonstration pumping plants erected from the funds provided by Village Uplift grants are being worked successfully at Kasap in the Kolaba district and at Yeranjade in the Thana district.

CHAPTER II.

AGRICULTURAL RESEARCH AND INVESTIGATION.

(9) *Introduction.*—As mentioned in the last year's report, the scientific research work forms one of the most important fundamental activities of the Department of Agriculture in the Province. This work continues to be carried out at numerous Government research stations and experimental farms throughout the Province and at the Poona Agricultural College. This has been possible as, in addition to about 41 per cent. of the Departmental budget being devoted to scientific research, financial assistance has been made available to approved schemes of investigation by the various special bodies such as the Imperial Council of Agricultural Research, the Indian Central Cotton Committee and the Sir Sassoon David Trust Fund. Details of such subventions received, during the year under report, are given in paragraph 99 of this Report.

(10) This Annual Report gives only a brief summary of the progress made in the various items of scientific research work carried out by the Department of Agriculture during the year. The first section of this Chapter deals with major fundamental research schemes referred to in the last year's report, viz., the Sugarcane Research Scheme at Padegaon and the Dry Farming Research Scheme at Sholapur and Bijapur. Subsequent sections deal briefly with scientific work on crop improvement either by botanical research or by control of insect pests and plant diseases, livestock research work, economic problems of agriculture, and, finally miscellaneous items of scientific investigations regarding cold storage research work, agricultural engineering, etc.

Section I.

SOIL AND IRRIGATION RESEARCH.

A. The Bombay-Deccan Sugarcane Research Scheme, Padegaon.

(11) The Scheme which is financed jointly by the Provincial Government and the Imperial Council of Agricultural Research has been extended for a further period of three years by the Imperial Council of Agricultural Research and the year under report is the first year of the extension. The work

which is directed towards investigation of fundamental soil and irrigation problems in relation to sugarcane cultivation in the Bombay-Deccan is divided into three sections, viz., soil physics, crop physiology and agricultural management.

(12) (*a*) *Soil Physics Section.*—The completion of the work on genetic soil survey of the three major Deccan Canals has brought out that, among the factors responsible for the variation in the formation, general characteristics and field behaviour of soils, topography is the most important, having a profound influence on the soil, climate and vegetation. Further progress has been made in the practical application of the genetic methods to the identification of soil types. Results of the soil fertility surveys on the Godavari Canals indicate a general increase in nitrogen and lowering in sodium saturation of soils due to irrigation thus showing a favourable effect of cane growing on these soils. A detailed investigation of soil factors contributing to the fertility of soils has revealed that generally the fertile soils seem to be more associated with lower pH values, lower calcium carbonate, higher available phosphate contents and higher moisture holding capacities of soils than the less fertile soils. Detailed studies of certain *kharif* crops including green manure treatments in rotation with cane showed that the effects of soil-tilth left after each of these was reflected to a certain extent in the germination of cane and in the earlier stages of plant growth. Later the tilth equalised and the green manure treatments gradually established themselves as superior to others. The final yields of cane showed the following order of treatments—*patada shevra sann* fallow cotton *jowar* groundnut. Studies regarding various aspects of the management of the chopan soil (alkali soil of the tract) show that, under all treatments of cane growing, there has been actual improvement in the colloid due to partial removal of sodium from the complex. On the basis of these investigations a scheme of experiments with cane on these soils has been proposed for trial in outside centres from the next season.

(13) (*b*) *Crop Physiology Section.*—Investigations into the bioclimatics have shown a detrimental effect of heavy rains of September on the growth of the cane specially in the non-flowering varieties with the resultant early maturity due to leaching down of nitrates. Experiments on the contribution of the subsoil water table to the water requirement have revealed it to be as high as 50 per cent. in case of its proximity at a depth of two and a half feet. They have further

indicated that the water requirement of the crop within the irrigational interval of ten days can be satisfied if the dose is just sufficient to keep the soil saturated to the surface two feet. In connection with the problem of inter-relationship of water and manure, it has been observed that, while there is a stimulation of the vegetative growth with increasing doses of nitrogen resulting in delayed flowering, the reverse is the case with higher delta. The wilting coefficient experiments which have been concluded after a thorough trial have conclusively proved that leading the crop to the stage of permanent wilting in summer does not in any way affect the yield, although it may show a temporary bad effect. The system of tenth day waterings during summer, as compared to the existing eighth day rotation, is definitely the best as it leads to economy of water without in any way affecting yield or maturity. Improved methods of the distribution and proportion of manurial top-dressings have been continued and the optimum mineral nutrition of the crop is being elucidated. Although the initial application of 100 lbs. P_2 O_5 is conducive to better performance of the crop, additional dose of 50 lbs. P_2 O_5 at earthing up time is found to be of no advantage from the standpoint of growth, but on the other hand leads to the reduction in the absorption of nitrogen by the crop. Experimental work is in progress on the varietal characteristics as regards their drought resistance and mineral nutrition and physiological behaviour of soil types. The utilisation of waste products as trash and molasses for manurial purposes by direct incorporation in the soil has given promising results. A point of great practical importance to cane growers has been investigated in research work in earthing up of cane.

(14) (*c*) *Agricultural Management Section.*—In the manurial investigations, the nitrogen series embrace such problems as suitable distribution and proportions of top-dressings and influence of basal manures like farmyard manure, sann and ground-nut cake. The latter has completed three years' cycle and has definitely proved similar performance of the crop between manure and sann; but the cake due to its higher nitrogen content has given significantly higher yields. In the phosphatic series, superphosphate has shown distinct superiority over bone meal. The irrigational investigations have brought out varietal characteristics quite distinctly, Pundia requiring higher nitrogen with higher quantity of water to get the same yield, while in the case of P. O. J. 2878, the favourable effect of higher watering is evident. With

regard to work on different cane varieties among canes planted in January, Co. 419 and Co. 413 have completed three years' trials and have consistently given higher yields than P. O. J. 2878 and Pundia. Co. 421 and Co. 426 have also outyielded these control varieties as in the last year. The July and October plantings have given similar results as in the previous year. In the case of chopan soil, Co. 419, Co. 413 and Co. 421 have shown promising performance. As regards the keeping quality of these varieties in the field, Co. 290, Co. 360, Co. 413 and Co. 419 are at their best by the end of February with a distinct drop in quality from April onwards. Investigations into the residual effect of new cane varieties on the succeeding crop of cotton has shown the least yields in the case of Co. 413 and the highest in the case of E. K. 28, Co. 360 and Co. 419 being intermediate. The varietal trial with cotton has shown the superiority of Banilla over others under experimentation. As regards plantings, the April end planting has given the highest yield in all the varieties except Combodia No. 2 which has shown similar result in May end planting.

B. The Bombay Dry Farming Research Scheme, Sholapur and Bijapur.

(15) The rainfall, during the year under report, was slightly above the normal at Sholapur but its distribution was most unfavourable. The intensity of a large number of showers was so great that the rain-water, instead of soaking into the soil, ran over the compacted surface of the soil and was lost by surface run-off. It affected the soil conditions at Sholapur so adversely that the Jowar crop was lost on deeper types of soil by seedling blight.

The rainfall at Bijapur was again characterised by shortage, the total recorded being 15·89 inches. This was only 70 per cent. of the annual average for the place.

(16) *Soil Investigations.*—Physico-chemical studies of the soils from Sholapur and Bijapur were continued. Two additional types of soil from the cotton-experimental area at Bijapur were examined both physically and chemically. Both of these showed a higher clay content than the other types from Bijapur. Soils treated with organic matter continuously for three years did not show any appreciable change in their hygroscopic coefficients or their moisture equivalents. The improvement of the light shallow soil at Sholapur by

disintegration of *murum*, during three years' period, was corroborated by the mechanical analysis.

During the year under report, nearly 25 per cent. of the total rainfall at Sholapur was lost by surface run-off from a plot which was well cultivated and which had a *rabi* crop of Jowar. The same plot lost the colossal amount of silt to the extent of 133 tons per acre. The uncropped and cropped lysimeters lost nearly 11 inches and 8 inches of rain water, respectively, by underground drainage. The drainage water carried in solution very high quantities of nitrogen as nitrates and also other fertility constituents from the soil.

(17) *Physiological Studies of the Jowar plant.*—Experiments on the water requirement of the Jowar plant were continued. The values obtained for water required by the Jowar plant were somewhat higher than those obtained in the previous years. One early-maturing selection tested this season was, however, found to be more efficient and required 15 per cent. less water. Developmental studies of the Jowar plant were carried out according to the improved technique. Root studies were also carried out according to the method suggested by Sir John Russell.

(18) *Agronomic Work.*—The replicated plot experiments, carried out at Sholapur to determine the value of different operations forming the dry farming method, were highly vitiated by a very severe attack of the seedling blight during the year under report. The blight was most severe on the deep black and the medium deep soils, while on the light shallow soil its intensity was somewhat less.

On account of the same trouble, the yields by the dry farming method, which was tried on a large area of nearly 24 acres, were in no way different from those obtained by the local cultivators' method tried on an area of 6·6 acres. It may be pointed out that the rainfall at Sholapur was slightly above the normal and had unfavourable distribution.

(19) At Bijapur, the rainfall was again deficient, being only 70 per cent. of the annual average. There was a general scarcity in the whole of the district of Bijapur. As the dry season of 1937-38 was the second immediately following that of 1936-37, its effect was more severely felt due to the cumulative effect of the two continuous dry years.

In the absence of any extraneous factor like the seedling blight which occurred at Sholapur, the field experiments at Bijapur have given again very promising results which are as follows—

(*a*) On deep black soil, annual shallow ploughing and deep ploughing in alternate years gave 54 and 65 per cent. more yield of grain, respectively, than mere harrowing; but on limy soil, simple harrowing was found to be the best.

(*b*) Listing and scooping on deep black soil gave, respectively, 24 and 34 per cent. more grain than the control but on limy soil, neither of these treatments showed any advantage.

(*c*) Mulching on deep black soil showed 28 per cent. increase in grain when compared with no-mulch but on limy soil there was no difference.

(*d*) Manuring with farm-yard manure increase the yield on the limy soil by 37 and 124 per cent. according as whether the manure was incorporated by harrowing or by ploughing. The addition of green *sann* increased the yield by nearly 138 per cent. On the deep black soil, however, both the manures failed completely to respond.

(*e*) Increased yields were obtained in the clean fallow, Jowar rotation on both types of soil; the increase on the limy soil was 65 per cent. but the increase on the deep black soil was only 22 per cent.

(*f*) Jowar crop grown after cotton in rotation gave 65 per cent. more grain yield on the limy soil but only 11 per cent. more on the deep black soil.

(20) The field scale trial of the dry farming method which includes alternate-year ploughing, harrowing, manuring with farm-yard manure in alternate years, bunding, wider sowing and inter-cultivation, gave an average yield per acre of 332 lbs. of grain and 380 lbs. of straw when tried on an area of 22·4 acres, while the local cultivators' method tried on 7·5 acres gave an average yield per acre of only 174 lbs. of grain and 196 lbs. of straw.

(21) These figures show the advantages of the improved method of dry farming. These results are more valuable as they were obtained under unfavourable and dry conditions of the two seasons in succession.

Section II.

The Improvement of Crops.

A. Cotton.

(*a*) *Gujarat.*—The work of cotton improvement in the Gujarat Division is centred at Surat, Broach and Viramgam. At all these places, scientific botanical research work is in progress towards the production of improved strains of cotton which will give higher returns per acre to the cotton-growers.

(22) *Botanical work on cotton improvement.*—At Surat, the work is in progress for the production of a type of Surat cotton which will possess the high spinning qualities and feel of improved 1027, A. L. F. already widely grown by cultivators in the district and which, at the same time, will give a higher ginning percentage similar to other strains of Surat cottons. Selection from a cross has been obtained which possesses a higher ginning of 3·8 per cent. than 1027, A. L. F. and has about the same staple length and grader's value as that of 1027, A. L. F. Selection was continued in all the crosses and back-crosses including those intended for combining wilt resistance and grown on wilt affected land of Surat Farm.

(23) *Broach Cotton Breeding Scheme.*—The work at Broach is being financed by the Indian Central Cotton Committee. The scheme has been extended for another five years. The work has for its object the production of suitable types of cotton for the Nerbudda-Mahi zone which will be wilt resistant heavy yielding and high ginning and spinning similar to Surat cottons. The selection N. S. 12 possesses high ginning and spins 26's but is short stapled though it yields higher than B. D. 8. N. S. 49 is medium in ginning and a good spinning cotton but is susceptible to virus trouble. The two crosses, viz., B. D. 8 × G. A. 26 and B. D. 8 × (B. D. 8 × G. A. 26), have produced a number of very promising segregates which are highly wilt resistant, gin fairly high, have good staple length and spin well. Back cross segregates 1–6, 6–20 and 6–25 are specially promising. These are under field trials for yield and further selection. This year's results show that straight crosses of Goghari with B. D. 8 give segregates that are more susceptible to wilt than B. D. 8-Back cross segregates.

(24) *Botanical work on cotton improvement at Viramgam.*— The object of this research is to obtain types of Wagad cotton which will be decidedly superior to local Wagad in spinning and will also give higher ginning and outturn per acre. Four types, viz., (1) Local Wagad, (2) Wagad 8, (3) Seg. 4-1 and (4) Seg. 7-1 were tested in six randomised replications. Seg. 4-1 is distinctly superior to local Wagad and Wagad 8 in ginning percentage but it shows too great a variation in spinning under adverse rainfall conditions. Seg. 7-1 is as good as Wagad 8 in yield of seed-cotton and as high ginning as Seg. 4-1. It is also superior to local Wagad in spinning; however its chief defect is wider opening. Both these cottons, however, would not suit the Wagad tract. For Lalio tract it will be better to have the types that may be evolved at Broach as the tract now grows Broach mixture. So in future, field trials of these two cottons will be discontinued. Selections from local collection of Wagad cottons are under study. Herbaceum cottons from Persia and Russia are under study particularly for crossing with local Wagad selections with a view to introduce earliness in the cottons.

(*b*) *Khandesh.*—The work of cotton improvement for Khandesh at Jalgaon is being financed by the Indian Central Cotton Committee by extending the scheme for another five years. The work is being continued with the same object mentioned in the last year's report.

(25) The two strains of Neglectum verum, viz., N. V. 56-3 (called Jarila) and N. V. 56-17, were given further trials in replicated plots on Jalgaon, Bhadgaon and Dhulia Farms. N. V. 57-7, being defective in growth and being unsuitable for the adverse climatic conditions of Khandesh, was dropped from the trials. Two new strains, viz., N. V. 56-17 and N. V. 201-3, were also included in the trial. The results show that Jarila was significantly superior to all the other three improved strains and also to Banilla and N. R. 6 on Jalgaon Farm and over Banilla and N. R. 6 on Bhadgaon Farm after groundnut crop. After bajri crop it did not differ significantly from the other strains. At Dhulia, it gave significantly higher yield over Banilla only. In district trials, Jarila proved superior to local in 18 trials, equal in 13 trials and inferior in 8 trials. Technological laboratory tests show that the commercial sample of a bale gave 19·9 counts with an average strength of 80 lbs.

The cotton at Jalgaon obtained a premium of Rs. 33 over Broach. High resistance to wilt of Jarila was noticeable all over the tract where wilt was present.

Though Jarila is highly resistant to wilt in field conditions it is susceptible to it under controlled optimum conditions. Therefore crossing of Jarila with higher resistant Million Dollar is undertaken with a view to obtain greater wilt resistance in the desirable commercial strains suitable for Khandesh.

(*c*) *Southern Division.*—The work of botanical research on the cotton crops of the Southern Maratha Country is centred at the Government Farm, Dharwar.

(26) *Botanical work on cotton improvement at Dharwar.*—The strain of Jayawant ×15 (11-0-1-4-5) reported to be promising last year gave as good a yield and staple length as that of Jayawant. Besides, it gives much higher ginning. Another strain of the cross of Jayawant ×15 has been found earlier and is to be tried in the district where earlier type is required. The mill tests for the spinning quality as well as the yield tests in the district of these two cottons will be taken. The work on wilt resistance of some selected Kumpta cottons was carried out on the Dharwar Farm.

(*d*) *Miscellaneous.*—

(27) The scientific research work under the direction of the Plant Pathologist at Poona on selecting the highly wilt resistant strains is carried out as a complement to the cotton breeding schemes in Broach, Khandesh and Surat. The work has yielded promising results and the technique developed gives reliable results in a short time.

(*a*) *Broach Section.*—During the year under report, the seed from 9 healthy plants out of 17 plants obtained from B.D.8 cultures last year was tested separately under optimum conditions of infection for a period of fifty days. The progeny of the nine plants suffered mortality from wilt in varying degrees, but three of these plants showed a very high degree of resistance and have been retained for further work. Similar work was done with N.S.12,B.D.8 crosses and Russian herbaceums. Seven healthy plants of N.S.12, also showing a very high degree of resistance, have been retained. A few promising selections from B.D.8 crosses and a culture from Russian herbaceums have also been retained for further tests in glass houses next year.

(*b*) *Khandesh Section.*—The seed from 131 plants of "Million Dollar" variety was tested in pot culture and the progeny of 76 plants did not suffer mortality from wilt

and has been retained for further work. Nine out of 10 plants of Chinese R.1 Spotless remained free from wilt and have also been retained. Similarly, selfed seed of " New Million Dollar " obtained from Nankin University, China, was tested in pot culture under conditions of optimum infection and none of the plants died of wilt although some of them showed " mosaic " or mottling symptom. These plants will be further tested in the glass houses next year.

(*c*) *Surat Section.*—The object of the scheme is to produce a cotton which is suited to the natural conditions obtaining in the Surat tract and at the same time is completely resistant to wilt. To achieve this purpose, the Cotton Breeder, Surat, will make crosses of 8-1, a high ginning and long staple segregate from 1027 × 1 A. L. B. cross, with wilt-resistant cottons such as B.D.8, N.S.12 and K.F. This work will be done at Surat and will be tested at Shera near Ankleshwar where a highly wilt-infected plot is being prepared.

(*d*) Studies in the relation of soil moisture to a wilt infection in cotton have shown that wilt is at its optimum in a range of soil moisture of 40 to 60 per cent. based on the water-holding capacity of the soil.

B. Rice.

(28) Botanical research work on the improvement of the rice crops of the Province is being carried on at various centres as reported in the last year's report.

During the year under report, rice breeding work was directed towards the testing of 4 promising Mugad strains and three promising Antersal strains of rice at the Mugad rice breeding station. These gave significantly higher yields than the local checks and are being multiplied for further distribution. Selections in the early variety, viz., Dodgya, are in progress and three promising strains gave decidedly better results than the local and are retained for further study. At the Kumpta Farm similar work on Muskaty, Jeddu, White and Red Halga and Mugin Bendu varieties is in progress. Improved strains of these varieties have given 9 to 30 per cent. higher yield than the local and further trials will be continued.

At the Karjat Rice Breeding Station, the work of improvement of rice for the Deccan and Thana and Kolaba tracts of the Konkan is being continued. For North Thana a strain

of Zinya, viz., Z149, has come out slightly superior to local Zinya in yield and particularly better in quality. This will be tried in the district. Selection 1-B-12-11 in Bhadas is also ready for district trial. Selections in Jirbuti and others are in progress. Hybridization with Kolumba strains is also in progress. Trials of a late Varangal strain No. 487 at Chiplun showed its superiority by 17·34 per cent. in yield over the local. This strain will be tried in the district.

Trials of the Fine Waksal selections conducted at Chiplun showed that strain No. 1 maintained its superiority by giving 21·7 per cent. more yield than that of the local. This strain will also be tried in the district.

C. Wheat.

(29) The wheat breeding work of the Agricultural Department is mainly located at Cereal Breeding Station, Kundewadi, Niphad, under the Crop Botanist to Government. During the year under report, the following promising selections for the crosses were under study :—

Baxi × Khapli 568, Baxi × Bansipalli.

808, Bansipalli 809 × Pusa 4, Bansipalli.

808 × Polish wheat and Bansipalli.

808 × Punjab type 1.

The selections in Khapali wheat are in progress. The station multiplied the seed of Bansi 168 and 229 and Bansipalli 808 to the extent of 1,140 lbs. for supplying the same to the district staff for further multiplication. The scheme to establish Rust Research Station at Mahableshwar and Poona recently sanctioned by the Imperial Council of Agricultural Research will be of material help in breeding rust resistant varieties of wheat for Western India.

D. Other Cereals.

(30) The scientific improvement of the bajri crop is specially attended to at Niphad and the methods used are those of in-breeding, group-breeding and mass selection.

Similar work is going on at Nadiad where Selection 207 is being tried on the farm as well as in the district.

At Mohol Farm selection and purification of Maldandi jowar strains are continued. Strains 35-1 and 47-3 are liked in the district. The former is early and specially suitable as a rain crop.

E. Tobacco.

(31) At Nadiad Tobacco Breeding Station, selections in Keliu variety which is widely grown in the tract were tested for yield and No. 24 and No. 49 are found promising.

The Station is studying the economics of flue curing for cigarette tobacco with a view to reduce the cost of flue curing to make growing of cigarette tobacco more profitable than the growing of local tobacco.

F. Other Crops.

(32) (*a*) *Linseed.*—The year under report was the fourth and final year of the Linseed Breeding Scheme financed by the Sir Sassoon David Trust Fund and directed by the Economic Botanist. The final selection has resulted in obtaining 18 strains which are superior for yield and higher oil-content and to some extent for the drying quality of the oil. These are suitable for the Karnatak and the Deccan and will be tried in the district.

(33) (*b*) *Castor.*—Two promising strains, viz., S-20 and S-5, are being multiplied and tried on the farm and in the district. These were selected for high oil-content and yield.

(34) (*c*) *Gram.*—The strain No. 18 was tried against local on the Dharwar Farm. No. 18 showed 2·2 per cent. wilting in the plants against 95 per cent. wilting in the local. The yield of No. 18 was 395 lbs. per acre as against a failure of the local.

(35) (*d*) *Nagli.*—The seed of improved Nagli strains were multiplied on the Hatkhamba Farm as before. This farm is now closed and multiplication of Nagli seed will be done on Ratnagiri Farm.

(36) (*e*) *Sugarcane.*—At Kopergaon Farm, comparative yield trials of different sugarcane varieties were continued as before and Co. 419 the new variety suggested by Padegaon Sugarcane Research Station gave the highest yield. Manurial, rotational and seasonal planting experiments were also conducted on this farm. Experiments to verify the results obtained on Padegaon Sugarcane Research Station are also laid out on this farm. At Gokak Farm, sugarcane varieties were continued to be tried and J 213 gave significantly higher yield over H. M. 544 as before.

(37). (*f*) *Vegetable crops.*—The botanical work of improving chillies and brinjals was continued for the seventh year at Ganeshkhind Garden under the direction of the Horticulturist to Government. A number of strains were selected from the Deccan chillies and these are under district trials. The results on 10 gunthas show that C-2 is better yielder but the absolute yield is much below normal and the results are not significant. As regards brinjals, No. 28-21 of Gote variety and 8-3-21 of Dorli variety show better yields over local. Improved strains will be tried in the district for yield and quality.

(38) (*g*) *Grazing and fodder crops.*—The work on rotational grazing and pasture improvement was continued under the Economic Botanist to Government. The season was very favourable and even after extending the period of grazing more than usual there was surplus grass left in the Kuran. The scheme of rotational grazing experiments submitted to the Imperial Council of Agricultural Research as reported last year has been approved by the Advisory Board with some modifications and it is awaiting the approval of the Governing Body.

Section III.

Livestock Research Work.

(39) (*a*) *Cattle.*—Research work on the improvement of cattle is being continued at two Government cattle farms, viz., at Chharodi, for the Kankrej breed and at Bankapur, for the Amrit Mahal breed.

At Chharodi, most of the cows are being milked to select and breed from the best milkers to produce a highly developed milk strain of cows. Besides this, a herd combining a fair yield of milk with good draft quality is being developed. In the milk as well as draft breeds on these two farms attention is particularly given to breeding for early maturity and good milk production or draft qualities. Herd registers of pure breeds in the Province are being maintained in the interest of the local breeders.

(40) (*b*) *Sheep.*—The Sheep Breeding Farm at Bhamburda, Poona, financed by the Imperial Council of Agricultural Research, was started in November 1937. The object of the farm is to evolve a type or breed of sheep which will be superior to the present indigenous sheep and also to study the reaction

of the Merino and its by-bred progeny in the Deccan conditions. 10 ewes and 5 rams of the Merino sheep of Wangenalla strain were obtained in January 1938 from South Africa. 41 ewes and one ram of the Deccan sheep were purchased during the year.

(41) (*c*) *Poultry.*—The Scheme for research in Poultry Husbandry, financed by the Imperial Council of Agricultural Research is now in the second year of its work at three centres in the Province, viz., Kirkee in the Poona district, Vadala in the Ahmednagar district and Ankleshwar in Broach district. The work at all these centres is supervised by the Livestock Expert to Government. The selection of birds for breeding is being done on the basis of trap-nesting records and feeding experiments are in progress. Special attention is being given to the design for a suitable cheap poultry house for use in the villages.

Section IV.

Miscellaneous Research Work.

Cold Storage Research Scheme, Ganeshkhind.

(42) *The Cold Storage.*—The year 1937-38 is the fourth year of the Cold Storage Research Scheme. The period of the scheme has been extended up to the end of February 1940.

The storage investigations on mango and oranges were continued. In the case of Malta orange, the size of the fruit has been found to influence the storage behaviour. Big fruits retain a much fresher appearance than small fruits in cold storage. Khed potatoes remained without sprouting at 40°F for seven months and did not sprout at all at 35°F. even after one year. A scheme for investigating the effect of cold storage of potato seed on the subsequent plant growth and yield is at present under consideration.

Preliminary storage trials of some important vegetables have been carried out. Cabbage could be kept in good condition at 32°F. for six months. Cauliflower, if wrapped in wax paper, remained in good condition for three months at 32°F. Green peas remained in marketable condition for four weeks at 32°-35°F.

Agricultural Engineering Research.

(43) *Defibration of Cotton Seeds.*—As reported last year, it was decided to close down the scheme for defibration of cotton seed at Palej and efforts were made to sell the DeSegundo defibrating machine but they have not so far met with success. It has, therefore, been decided to store it at the Surat Government Farm until it is sold.

(44) *Research work on Agricultural Implements and Machinery.*—During the year under report, further work was continued on the following implements :—

(*a*) Improved seed drill,

(*b*) Winnowing fans,

(*c*) Cart wheels fitted with ball bearings,

(*d*) Groundnut digger,

(*e*) Soil scooper,

(*f*) Ridgers.

In all six improved seed drills were sent to Khandesh and Southern Division for trials and demonstrations and about 114 acres were sown by them with different crops, such as Jowar, Wheat, Cotton, etc., and in addition 3 such improved drills were sold to people outside the Province. It has been noted that the drills do not work satisfactorily if there is any shower at the time of sowing.

Further improvements in the design of the winnowing fan have been made during this year as a result of experience gained so far. The latest model has been greatly appreciated by the people due to the ease in its working and its compactness. One such fan has been sold to Radhanpur State. There has now been a considerable demand for such fans from Khandesh and they are being got made locally and supplied. As regards the ball bearing wheels, a few minor improvements have been effected in the arrangement of fixing the ball bearings into the wheels to overcome certain difficulties. It has, however, not been possible to reduce the cost of manufacture to any extent. The idea has, however, been much appreciated by the public during the shows at Belgaum, Sanand and Broach. One set of such wheels was prepared for the Ravalgaon Sugar Farm and supplied, and an order for one more set is on hand from Sangli.

As regards the groundnut digger, further improvements in the machine were effected and they have been found to be very useful. However, it appears that the stiff soils in certain tracts demand still stronger supports for the blade and improvements in that direction as also in other points are taken in hand and the implement given further tests next season. The soil scooper at Bijapur was found to require still further improvements to effectively deal with the peculiar type of soil in that tract and it has, therefore, been brought to Poona for the purpose. The scooper at the Sholapur Dry Farm was slightly improved to confirm to the latest design. However, the factor of cost in case of both these improved implements will continue to be a real handicap.

The wooden and steel ridging implements designed for Gujarat were sent for trials at Surat in comparison with the local harrow. It was, however, observed that still further trials were necessary to form some definite opinion about their usefulness and arrangements are being made to test them again next year.

Section V.

Further Research Schemes.

(45) During the year under report, no new scheme was sanctioned by the Imperial Council of Agricultural Research.

The following schemes already sanctioned by the Imperial Council of Agricultural Research in the last year were started during the year under report :—

1. Sheep-Breeding Research Scheme.
2. Sann-hemp Cultivation Scheme.

The undernoted schemes already approved by the Imperial Council of Agricultural Research still await the necessary financial provision being made by that body before their commencement :—

(*a*) Scheme for investigation into "Striga" attack on Jowar.

(*b*) Scheme for research work on Goat Breeding.

(*c*) Scheme for research work on Cytology of the Papaya.

The undernoted schemes which were submitted to the Imperial Council of Agricultural Research are still under the consideration of that body :—

(*a*) Scheme for research work on poultry diseases.

(*b*) Scheme for wool analysis.

(*c*) Scheme for research work on grassland improvement.

(*d*) Scheme for research work on gas storage of fruits.

The scheme for research work on packing and grading of fruits submitted to the Imperial Council of Agricultural Research in the last year was passed on by that body to the Agricultural Marketing Advisor to the Government of India for consideration in connection with the proposals for establishment of experimental grading stations in future.

(46) The Indian Central Cotton Committee, at its meeting held in January 1938, sanctioned research scheme for the interspecific hybridisation in cottons at Surat at a total cost of Rs. 14,014 spread over a period of five years, but its work has not yet commenced. However, it is expected that its work will commence from 1st November 1938.

(47) The Sir Sassoon David Trust Fund Trustees have sanctioned two new schemes (1) for oil seed breeding (Rs. 11,287 for a period of five years) and (2) egg-marketing in Belgaum district (Rs. 1,288 for a period of three years) but work of these two schemes has not yet commenced.

CHAPTER III.

AGRICULTURAL SERVICE AND PROPAGANDA.

(48) *Introduction.*—In the last year's report the importance of creating an adequate and efficient non-official district organisation in touch, on the one hand with the scientific workers and, on the other hand with the cultivators themselves, was strongly stressed. Accordingly, Government have sanctioned the scheme of reorganising the district work by starting a large number of Taluka Agricultural Demonstration Centres on the holdings of the progressive agriculturists, which are to be cultivated and cropped in accordance with the improved methods advocated by the Agricultural Department, by the cultivator-owner himself, under the direct guidance of the staff of the Department. Provision has been made to organize 50 such Taluka Agricultural Demonstration Centres in 1938-39. Along with this an arrangement has been made to select about 900 Honorary Agricultural Agents who would be willing to devote some of their time to the work of persuading the agriculturists of his village to adopt certain agricultural improvements. It is hoped these two newly created non-official agencies will materially contribute to the improvement of the agricultural practice in the Province.

Section I.

Seed Supply.

(49) *Introduction.*—So far, organisations to multiply and distribute improved seeds have been successfully started with regard to cotton with the financial assistance from the Indian Central Cotton Committee. But the cultivator at large has not come into the picture very much and the result is that such schemes continue as long as the special organisation and finances continue. Unless the cultivator himself realises the importance of good and improved seed and is persuaded to play his part in the organisation of the production of pure seed locally to meet the local demand the work of replacing old seed by new improved varieties cannot be efficient and universal. Intensive efforts will have to be made to make the cultivator to play more active part in the production of pure seed for the village or groups of villages. Such work is slow and costly but will have to be done sooner or later if the average cultivator is to get the full benefit of the improved types of crops.

(50) *Seed Supply, Cotton.*—During the year under report, the following seed distribution schemes for the improved varieties of cotton were in force in the Province. These schemes continued to receive the financial assistance from the Indian Central Cotton Committee :—

(*a*) *Surat Seed Distribution and Extension Scheme.*—This scheme deals with the distribution and extension of improved cotton variety 1027 A.L.F. in the Surat tract. During the year, 1,963,486 lbs. of seed were handled by the Department, of which 942,862 lbs. were supplied to the Rajpipla and Chhota Udepur States and 8,90,843 lbs. were distributed in the Surat district by opening 23 seed depôts. Besides, 129,781 lbs. of seed were supplied by Co-operative Cotton Sale Societies to their members and others. The fall in cotton prices and the keen competition of other productions of improved cotton in Sind and elsewhere seem to have reduced the premium realized for improved Surat cotton which has tempted the people to favour inferior but high ginning cottons like Selection IA particularly when goghari has been driven out of Surat by the Cotton Control Act.

However, the people of Surat, including some leading co-operative workers, have come to realise that as long as 1027 A.L.F. is not grown and marketed pure it will not fetch its intrinsic value. It is, therefore, suggested that growth of Selection IA should be restricted to Olpad and 1027 A.L.F. to the rest of the Surat tract at least for three years to find out the intrinsic values of both these cottons when grown and marketed pure under legislative control so as to decide finally which cotton pays better. This will also help to maintain the reputation of Surat cotton. If this course is adopted the policy of Surat cotton will be on its way to permanent settlement after some fifteen years. The seed production area under departmental control grown with pure 1027 A.L.F. was 26,618 acres.

(51) (*b*) *B.D.8 Seed Distribution and Extension Scheme, Broach.*—This scheme is meant for the distribution and extension of high yielding and wilt resistant strain of improved B.D.8 in the Broach and Panch Mahals district. During the year, 2,004 acres were under departmental control for seed production and about 4,300 acres were under general seed. About 2,035 bales of pure B.D.8 cotton were sold in the market at a premium of Rs. 44 to Rs. 54 per candy. The seed produced from this area has been stocked for further multiplication and distribution in the 1938 season. This seed will be sufficient to cover about 14,000 acres.

(52) (*c*) *Revised Jayawant and Gadag No.* 1 *Seed Distribution and Extension Scheme, Southern Division.*—The work in connection with the distribution of Jayawant cotton seed was undertaken from seven centres, as the Hubli Sale Society also agreed to work the scheme as sanctioned by the Indian Central Cotton Committee and the local Government. The reserved area under pure Jayawant at 7 centres was 37,991 acres and 3,790,390 lbs. of seed were stocked of which 2,735,090 lbs. were distributed by departmental agents. Gadag No. 1 seed was produced on 19,858 acres of reserved area at two centres and 925,814 lbs. of pure seed were distributed. There was a slight set back in the extension of areas under these cottons due to unfavourable season. However, for the season 1938-39 seed, sufficient for 4½ lakhs of acres under Jayawant and 1½ lakhs of acres under Gadag No. 1, has been stocked.

(53) (*d*) *Jarila Seed Distribution and Extension Scheme, Khandesh.*—As reported last year, Banilla Seed Distribution Scheme has been replaced by a new scheme to distribute Jarila cotton seed. 9,368 lbs. of pure Jarila seed was available out of which 6,868 lbs. of seed were grown on 390 acres by reliable cultivators for further multiplication. The rest was sown on the Jalgaon and Bhadgaon farms and on trial plots in villages. 34,800 lbs. of seed produced on the farms have been stocked for growing in the inner reserved area. 50,315 lbs. of pure seed produced by reliable cultivators in the inner reserved area have been stocked for distribution in 1938 season. During the year, some Banilla seed was distributed by the Department and the private agencies in some suitable tracts pending the introduction of Jarila seed.

(54) (*e*) *Banilla Seed Distribution and Extension Scheme, Deccan Canals.*—This is the fourth year of the scheme. During the year under report, 31 acres were under Banilla cotton. The crop was badly affected by caterpillars, bugs and pink boll-worm. The average yield of cotton was 367 lbs. per acre and the scheme worked at a loss of Rs. 1,100 this year. Only 2,000 lbs. of good seed was available for supplying to the registered seed-growers. The seed-growers supplied 60,000 lbs. of seed for distribution and other organisations distributed 38,000 lbs. of seed.

(55) *Seed Supply, Other Crops.*—The multiplication and distribution of pure seed of improved varieties of all crops, other than cotton, is carried out chiefly by departmental agencies, assisted, in some places, by co-operative organization

and Taluka Development Associations. The main features of this work, during the year under report, were the distribution of 483,300 sets of improved sugarcane varieties at concession rates to canegrowers in the Deccan Canal tracts and 30,000 lbs. of improved groundnut seed of Nos. K 1 and K 3 in the same area. Besides, in the South-Central Division, 10,000 lbs. of improved jowar strains from the Mohol Farm and small quantities of nagli seed, Akola bajri and Pusa wheats were distributed. In the Southern Division, about 70 lakhs of improved sugarcane sets, 13,000 lbs. of groundnut, 27,000 lbs. of improved wheat seeds and a considerable quantity of improved rice seeds were distributed by the staff of the Agricultural Department and through the local Taluka Development Associations, etc. In Gujarat, in addition to the large distribution of improved cotton seed, good quantity of sann-hemp seed, improved wheat seeds, groundnut seed, improved sugarcane sets and improved jowar seed in the Surat and Broach and Panch Mahals districts and small quantities of bajri, maize and gram seed continued to be distributed. In the North-Central Division, progress reported last year has been continued in the distribution of improved wheat strains No. 168, 224 and Pusa 4 and as much as 440,000 lbs. of improved wheat seed were distributed with the help of Village Uplift Funds and other organisations. About 4,000 lbs. of Maldandi jowar seed were supplied in Khandesh and large quantities of improved seed of Kolumba varieties were distributed to cultivators in the Thana district. Fruit plantations, particularly of citrus plants and mangoes in Khandesh and coastal tracts and in Gujarat particularly in the Kaira district fruit plantations particularly of Basarai bananas, mangoes, guavas, citrus plants and pomegranates are being extended. Also pineapple suckers are in great demand on all coastal places from Surat to Kanara.

Section II.

Livestock Work.

(56) *Introduction.*—During the year under report, continued interest in the improvement of livestock was in evidence throughout the Province. There is no doubt that His Excellency the Viceroy's scheme of "Gift Bulls" for the grading up of cultivators' cattle has resulted in focussing public attention on this very important aspect of agricultural development and the time is now ripe for the establishment of

a Provincial organisation, including both non-officials and officials, to maintain interest and guide future development in the direction of organised cattle improvement in all districts of the Province.

In pursuance of the recommendation of the All-India Cattle Conference held at Simla in May 1937, the Provincial Government is pleased to constitute a Provincial Fodder and Grazing Committee consisting of ten officials and six non-official members to examine and advise on all matters connected with the use and improvement of grazing, grass and fodder of all descriptions.

(57) *Premium Bulls.*—The rearing, selection and distribution of premium bulls in selected cattle-breeding tracts of the Province, continued to be the major contribution of the livestock section of the Agricultural Department to cattle improvement in the Province. The following table shows the position of the "Premium Bull Scheme" in different divisions :—

Division.	Number of bulls.
South-Central	97
North-Central	33
Southern	65
Northern	58
Total ..	253*

(58) *Livestock Improvement Act,* 1933.—The Livestock Improvement Act, 1933, aims at the improvement of village cattle by the castration of all village bulls except such as are approved of for breeding purposes. During the year, the District Local Board, Sholapur, agreed to the proposal of the application of this Act in 12 villages in that tract. In Southern Division two more villages have been taken under this Act. In Dhulia taluka of West Khandesh six villages where pure Tapti Khillar cattle are bred have been recommended to the District Local Board for the application of the Act.

* This number includes 60 bulls that finished their term before the end of June 1938.

(59) *Palghar Dairy District Scheme.*—Some difficulty is experienced in the working of the scheme, due to the grantees of land not working up to the conditions of the grant.

(60) *His Excellency the Viceroy's Gift Bull Scheme.*—During the year under report, 127 bulls have been made available under the scheme by the livestock section of the Agricultural Department and stationed at suitable centres in the districts. Last year 90 bulls were made available. Much difficulty has been experienced in obtaining suitable cultivators to maintain these " Gift Bulls ".

(61) *Scheme for Buffalo Breeding and Improvement.*—The scheme for the improvement of the milch buffalo has been so worked up that the four Kamgars, specially appointed for the purpose, have now been asked to lay more stress to the cattle improvement side along with the testing of the buffaloes.

In all, 507 buffaloes of the main buffalo breeds in the Province have been tested, the details of which are embodied in the Livestock Expert's report.

(62) *Improvement of Village Poultry.*—A scheme for the improvement of village poultry by replacing scrub cocks by pure bred male stock, which was initiated by the Livestock Expert last year, has been making good progress. During the year, 212 pure bred cocks were put out in the districts. Besides, six poultry farmers were given premiums three in the form of housing and three in the form of pure bred birds for encouragement of pedigree poultry keeping.

(63) *Co-operative Egg Collecting, Grading and Marketing.*—As reported last year, this scheme has been discontinued.

(64) *Co-operation with Pinjrapoles, Gowshalas, etc., in cattle improvement.*—During the year under report, the Livestock Expert to Government continued to co-operate with the Bombay Gowrakshak Mandali, Kandivli, in the breeding of improved Gir cattle with the object of producing good male stock for distribution in the districts under His Excellency the Viceroy's Gift Bull Scheme and as Premium Bulls. The bulls put out from Kandivli were 15 during the year and 16 bulls are ready to go out. Proposals for the extension of co-operation between the Agricultural Department and Pinjarapoles, Gowshalas, etc., in the work of cattle improvement in the Province are under consideration.

Section III.

Crop Protection.

(a) Against wild animals.

(65) As stated on page 33 of last year's report, the gun-club activity spread more in the Southern Division where the work of hunting and shooting in the jungle is done by the cultivators themselves while in other parts of the Province the farmers have not much love for hunting themselves but are persuaded to contribute voluntarily and maintain a batch of shikaris who work with Government guns under the supervision of the shikar staff.

(66) In the Southern Division, three more Clubs were organized making the total of twenty. Five hundred and sixty-one pigs were killed and 90,000 acres of crops were protected. The work is very much appreciated and applications for extension of work are pouring in. Arwatgi, Kalkeri, Hulkop-Galgi and Varah Clubs were outstanding in their good work and killed 73, 97, 57 and 60 pigs, respectively. Operations against wild deer were continued at Kaujageri and were organized also in four other villages of Ron taluka and 107 deer were killed at a cost of Rs. 329 and 18,500 acres of crops protected.

(67) In East Khandesh as reported last year, four gun-clubs continued to work. In 107 hunts, 306 wild pigs and 42 Nilgais were killed and an area of 40,000 acres protected. The total cost on the shikar was Rs. 1,150 contributed partly from local subscriptions and partly from grants from Village Uplift Fund and the District Local Board. The demand for gun-clubs is increasing. The Raver Taluka Development Association maintained three shikaris in the interest of its members and killed 126 pigs at a cost of Rs. 257.

The scheme to control the Nilgai pest in the Kaira district in Gujarat was formed by the Department of Agriculture at the request of the Collector of Kaira and was sanctioned by Government. The campaign against Nilgai was organised and conducted by the Shikar Officer of the Department of Agriculture according to the scheme during March, April and May. Two hundred and thirty Nilgais were secured and 97 pigs were killed in Bhetasi village of the Borsad taluka at a total cost of Rs. 569. The cost was met by collections from villages, Rural Uplift Fund grant and the contributions made by the Taluka Development Associations of Anand and Borsad to the extent of Rs. 501-8-3.

The balance of expenses were met by the Department of Agriculture. The work was planned in consultation with the Collector and the local Mamlatdars.

(b) Against Insect Pests.

(68) As reported last year, the work on the protection of crops against damage from insect pests is carried out under the direction of the Professor of Entomology, College of Agriculture, Poona, and under the territorial Deputy Directors of Agriculture. During the year, many problems have cropped up awaiting solution. The work on insect research and control requires strengthening.

(69) *Research work.*—During the year under report, investigations were continued on numerous insect pests of crops, e.g., pea and cabbage aphis, citrus scales, fig mites, scales and jassidas, betel-vine bugs, fruits flies, etc., and control measures for many of these pests obtained are on trial on the cultivators' fields.

(70) *District work.*—The work of control of pests in the district is rather difficult as reported last year and special arrangements are being made to demonstrate and educate the cultivators on the proper methods of controlling various pests.

(71) *Plant-Puller Propaganda Schemes, Broach and Surat.*—The scheme was being worked intensively in the backward talukas of these two districts. During the year, rise in prices of plant-pullers and the fall in prices of cotton affected the progress of work. The Jambusar area in the Broach and Panch Mahals district where the plants grow well in goradu soils, stronger iron handle plant-pullers are needed and these cost more. 76 iron handle and 381 wooden handle plant-pullers were sold.

(c) Against plant diseases and fungi.

(72) Research work on the control of plant diseases and on fungi is done at the Poona College of Agriculture under the direction of the Plant Pathologist to Government. This officer also conducts research work on specific plant diseases at many centres in the province. During the year, the equipment of the Plant Pathological Laboratory at Poona has been greatly improved and a number of glass-houses have been constructed for fundamental research on virus diseases of plants. With these additional facilities, the laboratory should now be considered as one of the best equipped in the country.

(73) Investigations carried out by the Plant Pathologist to Government on the Cotton Wilt Breeding Scheme for Gujarat and Khandesh have resulted in obtaining 100 per cent. wilt-resistant types for the Gujarat and Khandesh districts. In particular, wilt-resistant types have been isolated from B. D. 8, N. S. 12 and the backcross (B. D. 8 × G. A. 26) × B. D. 8. An almost wilt-immune type has been obtained in *Gossypium arboreum* var. *neglectum*, and it should now be possible by means of hybridisation to evolve a 100 per cent. wilt-resistant cotton suitable for Khandesh area. The wilt-immune strain of sann-hemp, D-IX, is being multiplied, and it is hoped that the seed of this strain will be available for distribution in two or three years. The investigation into the wilt of *Lathyrus sativus* has shown that it is caused by *Fusarium* and work on the development of a resistant type has already been undertaken.

(74) Among other diseases of economic importance, the Plant Pathologist has devised effective control measures against mottle-leaf of *mosambi*, powdery mildew of betel vines and fig rust. There is a large number of other diseases under investigation, and mention may be made of fruit rot and twig blight of mango, leaf spot of mango, black rot of custard apple, tobacco seed-bed diseases, "Panama" disease of bananas, etc. In connection with the Virus Scheme sanctioned by the Imperial Council of Agricultural Research, glass-houses are being built, but due to unforseen difficulties investigation work has not yet been undertaken.

Very important results have been obtained in connection with the fundamental problems connected with the *koleroga* disease of the betelnut palm. It has, for example, been ascertained that the fungus causing the *koleroga* disease lives as dormant mycelium in the dead crown of the betelnut tree and on the return of favourable conditions with the onset of the monsoon, the fungus resumes activity and comes out on the surface of the dead portion of the tree to produce numerous spores. These spores are easily disseminated by wind and are responsible for initiating primary infection. These studies are of great practical value and will lead to the devising of more effective methods of control.

The scheme for the establishment of a Rust Research Station in this Province has been sanctioned by the Imperial Council of Agricultural Research. Work will be done at Mahableshwar from October to June and at Poona during the monsoon. The amplified scheme is now meant for the whole of peninsular India.

(75) The investigations on *striga* on jowar and orobanche on tobacco were continued by the Economic Botanist to Government to obtain jowar and tobacco plants resistant to their respective parasites.

The scheme for intensive research on *striga* on jowar has been approved by the Governing Body of the Imperial Council of Agricultural Research and the work will start soon.

(76) In the Southern Division, extensive propaganda work was undertaken to spread the practice of spraying with Bordeaux mixture as a control measure against *koleroga* disease on the betelnut palms. In Siddapur taluka, an area of 2,008 acres was sprayed during the year and the loans amounting to Rs. 8,855 were made to the gardeners to meet the cost of spraying machines and chemicals and to meet the wages of expert climbers. This work was intensively organised in 101 villages this year also. Similar work, but on a less intensive scale, was carried out in Honavar, Kumpta, Sirsi and Yellapur talukas of the Kanara district. The total area sprayed was 3,487 acres against 3,516 of last year and the total saving to the garden owners is estimated to be Rs. 1,50,000 at Rs. 43 per acre sprayed.

Section IV.

Publicity.

(77) The most important and effective method of publicity work of the Agricultural Department amongst the cultivators is the numerous demonstrations and meetings held on the trial plots on the fields of the cultivators or on the farms in all the tracts of the Province. During the year under report, the district officers of the Agricultural Department organised a very large number of such demonstrations and propaganda meetings many of which were attended by local agriculturists, prominent non-official workers in rural areas and the local officers of other Departments of Government. The real value of the demonstrations lies in the informal discussions raised by the interested cultivators and not so much in the formal attendance of a large number on these occasions, and special attention is paid to such discussions with the cultivators. In the North-Central Division as many as 2,011 demonstrations, including lectures, were arranged and were attended by over a lakh and quarter people. Similar activities were conducted in other divisions, details of which will be found in the reports of the Divisional Deputy Directors of Agriculture concerned.

Shows.

The Karnatak Agricultural Show was the oustanding event of the year. This show was held at Belgaum in January 1938. Though the show was organized on divisional basis it was of the same magnitude and comprehensiveness as the other two previous Presidency shows held at Poona and Ahmedabad. The divisional show had its special advantages over the Presidency show by focussing greater attention to the practical agricultural problems of the division and reducing the unnecessary difficulties and expenses in catering for the ryots of the whole Province covering a number of regional languages.

Most of the States, geographically related to the division, took part in the show. On the popular side, the Karnatak Provincial Congress Committee took active part in the organisation of the show. The Karnatak Spinners' Association organised an interesting and very important section of cottage industries. The show was attended by a large number of cultivators.

The principal organisers of the show, namely, Mr. J. A. Madan, C.I.E., I.C.S., Commissioner of the Southern Division (Chairman), Rao Bahadur S. S. Salimath, Deputy Director of Agriculture, Southern Division, and Rao Saheb Wamanrao Desai (Joint General Secretaries) deserve special commendation for their sustained and well directed efforts, which culminated so successfully. The Commissioner was able to draw upon his personal intimate knowledge of the farmer and his conditions and of the Department of Agriculture acquired during his Secretaryship of the Royal Commission on Agriculture and the Government, Revenue Department.

Besides this, large number of district agricultural shows were organized at suitable centres, e.g., at Sanand in the Ahmedabad district, at Broach, at Haripura in the Surat district, at Khatgur in the Khatav taluka of the Satara district, at Sholapur and at Bandhan in the Thana district.

During the year under report, contributions amounting to Rs. 33,619-6-3 were granted from the Bombay Presidency Agricultural Show Fund to the following agricultural shows :—

	Rs.	a.	p.
(1) Karnatak	19,850	0	0
(2) Ahmedabad	99	1	3
(3) Sanand	9,000	0	0
(4) Broach	2,820	5	0
(5) Sholapur	200	0	0
(6) Vithalnagar	500	0	0
(7) Bombay Presidency Poultry Show at Poona	500	0	0
(8) Bandhan, taluka Palghar, district Thana	450	0	0
(9) Indian Industries Fair, Bombay..	200	0	0
Total ..	33,619	6	3

The members of the Agricultural Department contributed articles dealing with matters of local agricultural problems in numerous papers and periodicals in the districts. A special leaflet showing how to organise gun clubs and the poster to show how the Forest, Police and Agricultural Departments can co-operate in the protection of crops were printed and freely distributed.

Rural uplift vans in the Southern Division, South-Central Division and North-Central Division, equipped with the agricultural propoganda materials, visited a number of villages in the respective areas to educate the cultivators in improved methods of farming.

Section V.

Rural Uplift.

(78) During the year under report, the Department of Agriculture continued to take the same interest as before in the initiation, organisation and supervision of various schemes proposed by the Department for rural uplift and village improvement. The funds were sanctioned by the various Collectors from the grants made available by the Government of India.

(79) In the North-Central Division, the schemes carried out by the Agricultural Department in connection with the rural uplift work are given in detail in Appendices attached to the report of the Deputy Director of Agriculture, North-Central Division. Considerable further progress has been made during the year with the distribution of pure seed of improved crops, control of damage from wild animals and crop diseases, development of poultry and cattle and protection of land from soil erosion.

(80) In the South-Central Division, attention was mainly concentrated upon the work of seed and implement supply and bunding of land through the Taluka Development Associations, development of cattle and poultry, planting of trees and supply of fruit plants. The Deccan Agricultural Association continued its good work in 14 villages near Poona and helped considerably the village improvement work in various ways.

(81) In the Southern Division, the schemes for the supply of seed of improved paddy and sugarcane, construction of Poona gul furnaces, bunding operations, conservation of farm-yard manure and opening implement depôts were carried out with success during the year.

(82) In Gujarat, grants were continued to the Taluka Development Associations for propaganda work for improvement of agriculture in two backward talukas.

Besides, grants were made for the supply of breeding bulls, improved poultry stock and control of wild animals which damage crops.

(83) Under the Livestock Expert to Government, the undernoted schemes were carried out as Rural Uplift Work :—

(*a*) Improvement of the buffalo and its milk supply. This scheme has been now amalgamated with the general cattle improvement work.

(*b*) Improvement of poultry in villages.

(*c*) Encouragement of pedigree poultry keeping in villages by premia to approach poultry farms.

The work done under these schemes is dealt with in the "Livestock Work" section of this report and in the detailed report of the Livestock Expert to Government.

Section VI.

Miscellaneous.

(1) *Agricultural Marketing.*

(84) (*a*) *All-India Marketing Investigation.*—The work in connection with the All-India marketing investigation continued to be in charge of the Professor of Agricultural Economics, College of Agriculture, Poona. During the year under report, the preliminary reports on rape, mustard, markets and fairs, potatoes, citrus fruits, ghee, butter and co-operative marketing were prepared and submitted to the Agricultural Marketing Adviser to the Government of India. Further market surveys in gul, sugar, maize, barley, gram, cocoanuts, fibres, mango, cashewnut, fish, lac, wool, hair, sheep and goat are in progress. Efforts were made to apply grading to the marketing of mosambi and eggs.

(85) (*b*) *Cotton Marketing.*—During the year under report, the regulated cotton markets at Dhulia and Amalner in Khandesh, at Baramati in the South-Central Division and at Bail-Hongal in the Southern Division worked successfully. Preliminary arrangements for establishing regulated cotton markets at Bijapur in the Southern Division, Jalgaon and Dhondaicha in Khandesh and at Broach and Bavla in Gujarat were completed but markets have not yet started to work. Attempts are being made to establish markets at Gadag, Nargund and Hubli.

Grading and auction sales of Jayawant and Gadag No. 1 cottons were carried out in the Southern Division with greater success in connection with the seed multiplication and extension scheme for these improved cottons. The extra prices realised at such auctions averaged at about Rs. 10 per naga of 1,344 lbs. of seed cotton.

(86) (*c*) *Fruit and Vegetable Marketing.*—As a result of the activities of the fruit and vegetables market committee, the transport companies have extended the quarter-freight concessions to many fruit and vegetables and the concession has been made available to several new stations sending fruits and vegetables to Bombay. It is noticed that this concession has brought in goods from far away centres from outside the Province and perhaps some inter-Provincial regulation of supply may be necessary if the primary producers are not to suffer from dumping of goods from all over the country at the same time. The transport companies have afforded facilities to deliver the fruit to the agents in the markets. Bombay Municipal Corporation has opened a new wholesale

vegetable market at Byculla. Some fruit agents continued to send Alphonso mangoes to Europe.

(2) *Agricultural Engineering.*

(87) (*a*) *Tractor ploughing against hariali in the Southern Division.*—During the year under report, Government ordered that an investigation into the cost of tractor ploughing operations should be carried out for a month with a view to arrive at a reasonable rate per acre at which the proposed tractor ploughing syndicate might undertake the work. Mr. V. S. Kulkarni, District Agricultural Overseer, Dharwar, was deputed to collect full details of the operations and he has submitted a detailed report embodying all the factors involved in the cost of ploughing and the report has been submitted to Government.

(88) (*b*) *Agricultural Engineering service.*—The Agricultural Engineer to Government dealt with 219 inquiries for advice in connection with the installation and maintenance of agricultural machinery, got 282 power plants inspected through the Mechanical Assistants in the divisions, erected 25 and repaired 15 plants, surveyed 37 sites and submitted 39 estimates for power plants. He has also sold 3 boring machines and supplied on hire 15 pumps and 12 boring machines.

In addition to the above routine works, the agricultural engineering section had to spend much of its time and energy on the following special works :—

(*a*) Agricultural shows at Belgaum, Sanand, Broach and Bandhan.
(*b*) Constructions at the Sheep Breeding Station, Poona.
(*c*) Construction of a glass house at the College of Agriculture, Poona.
(*d*) Construction of quarters at the College of Agriculture, Poona.
(*e*) Construction of quarters and Dutch barn, etc., at the Cereal Breeding Station at Niphad.
(*f*) Repairs to 12 power boring machines.

The total receipts from hire and sale of material amount to Rs. 16,724-3-4.

(3) *Poona Agricultural College—Services rendered by Heads of Sections in expert advice, etc.*

(89) The demand for expert advice and assistance by the expert officers in charge of sections of the Agricultural College,

Poona, was met as under. During the year under report, the Professor of Agriculture dealt with over 700 enquiries concerning implements, growing of crops, manures and manuring, seed supply, clean milk production, transport of milk, etc. The college dairy gave 51 bull services for the cattle owned by private persons. The Horticulturist to Government answered 1,185 enquiries regarding fruit cultivation, preparation of fruit products, etc. The Agricultural Chemist carried out the analyses of 611 samples, of which 224 were of soils, 29 of water, 36 of manures, 45 of feeding stuffs, 67 of seeds and grains, 29 of dairy products, 50 of fruits and the remainder, miscellaneous. Similarly, heads of Plant Pathology and Entomology sections dealt with a large number of enquiries in connection with their sciences and in addition organised numerous demonstrations, in co-operation with the territorial Deputy Directors of Agriculture, of control measures against plant diseases and insect pests of crops in the Province. These two officers spend considerable time in the examination of consignments of plants or plant products meant for export to foreign countries and in the issue of phytopathological certificates. Government have set up "Insect Pest and Plant Disease Committee" under the Chairmanship of the Director of Agriculture for co-ordinating the work of research and demonstration of control measures against insect pests and plant diseases, for framing schemes for research and for keeping records of the incidence and character of plant diseases and pests and of the damage done by them. The Plant Pathologist to Government is the Secretary of this Committee and Professor of Entomology is a member on it. The Economic Botanist to Government carried out tests on 102 seed samples and identified 178 plant specimens. The Professor of Agricultural Engineering inspected the sites suggested by the Deputy Directors and rendered advice on schemes of land development and control of soil erosion. He also surveyed 23 tank schemes and located 12 tank sites and did levelling work in the Satara district in co-operation with the Rural Reconstruction Association, Satara. Besides, he helped to plan the cultivators' bunding classes, supervised and co-ordinated the work and rendered technical advice. The Professor of Agricultural Economics also dealt with many enquiries concerning his subject. Besides, all the Heads of Sections worked as secretaries and arranged for the stalls regarding heir sections at the Karnatak Agricultural Show at Belgaum nd at other shows, fairs and exhibitions.

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CHAPTER IV.

AGRICULTURAL EDUCATION.

(90) *The College of Agriculture, Poona.*—The Poona Agricultural College is the only institution in the Province devoted to higher agricultural education in addition to scientific research work and the supply of expert advice to agriculturists on agricultural problems. During the year under report, the number of students, who attended the College, showed no diminution.

The new B.Sc. (Agri.) course is now in full force. This year a Forest Rangers' class has been started at the College wherein some of the science courses are taught by the College staff and the forestry part is dealt with by the Forestry Instructor. Special courses were, as usual, held at the College, the number of students attending being 28 as compared with 24 in the previous year. This shows that the demand for specialised training is on the increase. The Agricultural Graduates' Employment Board, maintained at the College to assist the Agricultural Graduates to obtain suitable employment after graduation, had only 28 members this year, as a large number of the old members discontinued. Four new members were added. Fifteen enquiries were received from employing agencies and were circulated amongst the members.

Nineteen students and some members of the College staff took part in the Rural Reconstruction work in the Satara district. Some students also worked as foremen instructors in the bunding classes conducted by the Department.

Special short instructional courses were arranged for the Assistant and Deputy Collectors, Army Rural Reconstruction classes, Reservists of Royal Bombay Sappers and Miners, Co-operative Department training classes and Honorary Agricultural Agents of the Poona district.

The Research and Advisory activities at the College are reviewed in the chapters of this report dealing with these subjects.

(91) *Marathi and Kanarese Agricultural Schools.*—The Marathi Agricultural School at Dhulia and the Kanarese Agricultural School at Devi-hosur were under the control of the Department of Agriculture. Another Marathi Agricultural School at Rajapur was managed by the private agency. All these schools continued to do good work. Dhulia school completed 15th year and had 30 students this year, 14 being in the first

and 16 in the second year. The horticultural and poultry sections have been well developed at this school. The Local Agricultural School Committee continued to manage the finances of the school efficiently. The school at Devi-hosur completed 24th year and had 32 students, 13 being in the first and 19 in the second year. Rajapur school had 18 students in the first year and 8 in the second year.

(92) *Agricultural Bias Classes.*—The number of agricultural bias classes remained unchanged at 93 during the year under report. The Committee appointed by Government to report on the vocational training in Primary and Secondary Schools has suggested a compulsory primary course of agriculture for first seven standards for all rural schools and if this course is to be adotped and developed on proper lines the Department of Education should have the services of a first class Agricultural Officer trained in Agricultural Education preferably in U. S. A. where the agricultural courses in primary schools and high schools are well developed. Such an officer, assisted by a number of agricultural graduates in different divisions, will develop properly the whole system of agricultural education in rural schools. The teachers too will require sound scientific and agricultural training before they can properly teach the new courses in agriculture and nature study. If the experiment is started without proper technical guidance and supervision of a competent agricultural officer qualified to deal with agricultural education there is a grave danger of the failure of the new scheme.

(93) *Miscellaneous.*—A training class for oil-engine mechanics was conducted by the Agricultural Engineer to Government. Eighteen students were admitted and given training in the management and care of oil engines and pumps. Sixteen students from various districts were trained in poultry farming at the Goverment Central Poultry Farm at Kirkee. Fifteen students attended the practical course in animal husbandry and dairying at the Agricultural College Dairy, Kirkee. Thirty students attended the practical training class in horticulture at the Ganeshkhind Fruit Experimental Station. Kirkee, and, in addition, district classes in horticulture were arranged by the Divisional Deputy Directors with the help of the Horticulturist where necessary.

CHAPTER V.

ADMINISTRATION AND FINANCE.

(94) *Introduction.*—The general administration of Agricultural Department continues to make ever-increasing demands upon the Director of Agriculture, the Deputy Directors of Agriculture and the senior expert officers dealing with the research and extension work in the districts on account of the rapid and extensive developments of all branches of departmental activities, especially in connection with the Government plan of improving the general conditions of life in rural areas and improving the economic conditions of the cultivator. The work of the Department has been slowly but surely extending all over the Province but Government and the public are anxious to see more concentrated and intensive work so that the progress of agricultural impovement may be more visible and impressive.

The every day increasing co-ordination of the work of the Agricultural Departments in India for different items of agricultural development, under such organisations as the Imperial Council of Agricultural Research and the Indian Central Cotton Committee, has resulted in a considerable increase in the administration work of the Department. All officers of the Department have borne their share of this additional burden which has continued to be willingly shouldered in the interests of the cultivators of the Province.

Section I.

Administration.

(95) *Staff.*—Dr. W. Burns, Director of Agriculture, continued to be on deputation as Agricultural Expert to the Imperial Council of Agricultural Research under report, and Mr. W. J. Jenkins officiated as Director of Agriculture till 22nd April 1938 when he proceeded on leave for 6 months and 28 days. Mr. Jenkins was on deputation to the Cutch State to advise the State on the best method of improving cotton crop in the State from 26th March to 7th April 1938. Mr. B. S. Patel, Principal, Agricultural College, Poona, and Professor of Agriculture, was appointed to officiate as Director of Agriculture. Mr. B. S. Patel continued to act as Livestock Expert to Government till 3rd December 1937 vice Mr. E. J. Bruen, on leave, and thereafter he was appointed as Deputy Director of Agriculture, South-Central Division, Poona, from 4th December 1937 to 9th March 1938 and from 10th March 1938 he was appointed as permanent Principal and Professor of Agriculture, College of Agriculture, Poona, vice Mr. V. G. Gokhale, retired. He held charge of the Principal and Professor of Agriculture, College of Agriculture, in addition to his officiating charge as Director of Agriculture, up to 23rd May 1938 when he was relieved by Rao Bahadur Tamhane.

Mr. E. J. Bruen, Livestock Expert to Government, returned from leave on 3rd December 1937. Mr. V. G. Gokhale, Principal and Professor of Agriculture, College of Agriculture, Poona, retired from Government service from 10th March 1938. Rao Bahadur V. A. Tamhane, Deputy Director of Agriculture, Gujarat, is officiating as Principal and Professor of Agriculture, College of Agriculture, Poona, from 24th May 1938 vice Mr. B. S. Patel, appointed to officiate as Director of Agriculture.

Mr. L. S. S. Kumar, Economic Botanist to Government, continued to be on deputation to the Fourth International Grassland Conference held in Great Britain up to 4th August 1937 and then on leave out of India from 5th August 1937 to 18th September 1937 and during his absence out of India, Mr. V. M. Chavan, Assistant Professor of Botany, continued to act as Economic Botanist to Government and Mr. S. R. Godbole, Agricultural Overseer, as Assistant Professor of Botany.

Dr. J. A. Daji, Agricultural Chemist to Government, was on leave for one month from 9th May 1938 and, during his absence on leave Mr. N. Narayana, Assistant Professor of Chemistry, officiated in that post.

Mr. J. P. Trivedi, Professor of Agricultural Engineering, Physics and Mathematics at the Agricultural College, was on leave from 10th May 1937 to 9th July 1937 and Mr. A. A. Vasavada, Agricultural Overseer, acted for him.

Mr. H. G. Baluch, Assistant Professor of Dairying and Manager, Agricultural College Dairy, was appointed to officiate as Deputy Director of Agriculture, Gujarat, from 21st May 1938, vice Rao Bahadur V. A. Tamhane, appointed to officiate as Principal and Professor of Agriculture, College of Agriculture, Poona, and Mr. M. M. Desai, Assistant Livestock Expert, was appointed to officiate as Assistant Professor of Dairying and Manager, Agricultural College Dairy, from 20th June 1938, which charge was held by Mr. K. S. Kulkarni, Assistant Professor of Agriculture, from 21st to 25th May 1938, and by Rao Bahadur V. A. Tamhane, from 20th May to 19th June 1938 in addition to their own duties.

Mr. V. M. Chavan, Assistant Professor of Botany, was on short leave for 25 days from 6th May 1938 and during his absence on leave Mr. L. S. S. Kumar, Economic Botanist to Government, held charge of the post in addition to his own duties.

With regard to the staff of the Agricultural Department in the districts, Rao Saheb G. L. Kottur, Cotton Breeder, S.M.C., was on leave for one month from 1st September 1937. Mr. V. C. Pavate continued to act as Cotton Superintendent, S.M.C., Dharwar. Mr. V. S. Kulkarni, Agricultural Overseer, was appointed as Assistant to the Deputy Director of Agriculture, Southern Division, for 5 months from 1st September 1937 in connection with the Karnatak Agricultural Show held at Belgaum.

Mr. G. B. Patel, Cotton Breeder, North Gujarat, Viramgam, was on deputation to the Cutch State for 2 months from 23rd February 1938, during which period Mr. V. M. Majmudar, Agricultural Overseer, officiated in that post.

Mr. G. P. Patil continued to officiate as Divisional Superintendent of Agriculture, Deccan Canals, Baramati. Rao Saheb S. H. Prayag, Cotton Breeder, Khandesh, Jalgaon, was on leave for 1 month and 10 days from 2nd May 1938 and during his absence on leave Mr. K. V. Joshi, Deputy Director

of Agriculture, North Central Division, held charge of the post in addition to his own duties.

Mr. K. F. Kheshvala who was appointed to the post of the Assistant Plant Pathologist in connection with investigations into *koleroga* disease of betel-nuts continued to be on leave up to 7th August 1937, when he reverted to his substantive post at New Delhi and Mr. M. K. Desai, Agricultural Overseer, was appointed to this temporary post from 1st December 1937 on probation for one year.

Rao Bahadur B. P. Vagholkar, Principal Agricultural Officer, Sugarcane Research Station, Padegaon, was on leave for 27 days from 1st November 1937. During his absence on leave Dr. R. D. Rege, Crop Physiologist under the scheme, held charge of the post in addition to his own duties. Rao Bahadur Vagholkar has also been on leave for 4 months preparatory to retirement from 16th May 1938 and Dr. R. D. Rege has been appointed to hold charge of the post of the Principal Agricultural Officer in scheme in addition to his own duties. Dr. J. K. Basu, Soil Physicist, Padegaon, was on leave for 25 days from 3rd January 1938. During this period, Dr. R. D. Rege held charge of the post in addition to his own duties. Mr. N. V. Kanitkar, Chief Investigator, Dry Farming Research Scheme, Sholapur, was on short leave for 21 days from 6th May 1938 and Dr. V. N. Gokhale, Assistant Investigator in the scheme, held charge of the post in addition to his own duties.

Mr. A. K. B. Cazi has been appointed for 2 years from 1st September 1937 as Assistant Marketing Officer in the Scheme for the improvement of Marketing in India financed from the funds of the Government of India, vice Mr. M. M. Desai, appointed as Assistant Livestock Expert in the temporary post.

Mr. R. Y. Hulkoti, Inspector of Agricultural Schools, returned from leave on 16th October 1937 after enjoying combined leave for 6 months and 16 days from 30th March 1937. He was again on leave for 1 month from 27th January 1938.

Mr. H. M. Desai, Agricultural Overseer, was appointed to act as Personal Assistant to the Director of Agriculture from 24th April 1938, and Mr. V. G. Kelkar who was acting in that post reverted to his original position of the Senior Superintendent in the Office of the Director of Agriculture.

Mr. M. M. Desai, Agricultural Overseeer, held charge of the temporary post of the Assistant Marketing Officer up to 31st August 1937 and he was appointed in the temporary post of

Assistant Livestock Expert created for 2 years from 1st September 1937 until he was appointed to act as Assistant Professor of Dairying and Manager, Agricultural College Dairy, Kirkee, from 20th June 1938 as mentioned above.

During the year under report, Mr. K. V. Joshi continued to act as Deputy Director of Agriculture, North-Central Division, Nasik. Rao Bahadur B. P. Vagholkar and Mr. N. V. Kanitkar continued to be on deputation under the Sugarcane Research Scheme, Padegaon, and the Dry Farming Research Scheme, Sholapur, respectively. In their absence, Mr. V. V. Gadgil continued to act as Deputy Director of Agriculture, South-Central Division, Poona, except for a period from 4th December 1937 to 9th March 1938, when he proceeded on leave and reverted to his substantive post in the Department. Mr. N. Narayana continued as Assistant Professor of Chemistry, College of Agriculture, Poona. Dr. T. G. Shirname continued to be on deputation on the Central Staff of the Marketing Survey Organization under the Government of India and during his absence Dr. M. B. Ghatge continued to act as Professor of Agricultural Economics, Agricultural College, Poona.

(96) *Retirement.*—Principal V. G. Gokhale was the student of Agriculture at the Old College of Science (now the College of Engineering) where agriculture was taught. He graduated in 1906. He entered service in the Department as an undergraduate as a clerk and after graduation worked successfully as Superintendent of the Agricultural College Farm, Extra Deputy Director of Agriculture, Konkan, and Deputy Director of Agriculture, Konkan, since 1921 when he was admitted to the Imperial Agricultural Service. He then came to the College of Agriculture, Poona, as Professor of Agriculture and continued there till he retired. He will always be remembered as a very keen, hard working and sympathetic officer. Because of these qualities he rose to a high position of the principalship of the College of Agriculture. He had the honour to be the first graduate of the College to become a permanent Principal of the College. He lived a simple life and had high ideals. As a Principal, he introduced many new things for the benefit of the students. His love for agriculture is so keen that he has taken to farming on retirement and the best wishes of his former colleagues and students accompany him in his retirement.

(97) *Corruption.*—There were no cases of corruption in the Department.

Section II—FINANCE.

(*a*) Departmental Expenditure and Receipts.

(98) The expenditure of the Agricultural Department during the year under report was Rs. 11,60,476 as against Rs. 11,43,207 in the preceding year. The increase was mainly due to extra expenditure on account of the (1) changes in personnel, (2) travelling allowance of the staff to attend the Karnatak Agricultural Show and other special activities, (3) Government subsidy to the Hubli and Gadag Cotton Seed Distribution and Extension Schemes financed by the Indian Central Cotton Committee and (4) reconditioning the boring machines.

The receipt of the Department amounted to Rs. 2,27,789 as compared with Rs. 2,07,539 in the previous year. The increase was due mainly to better yield of crops and also to the realisation of profit on the transactions financed from the Personal Ledger Account of the Director of Agriculture.

(*b*) Subsidies and Grants.

(99) The subsidies and grants noted below were placed at the disposal of the Director of Agriculture for approved schemes of agricultural research, seed distribution, rural uplift, etc., during the year under report, by the :—

(1) Imperial Council of Agricultural Research,
(2) Indian Central Cotton Committee,
(3) Sir Sassoon David Trust Fund,
(4) Village improvement grants made by the Central Government,
(5) Donations to His Excellency the Viceroy's Cattle Improvement Scheme.

(1) *Imperial Council of Agricultural Research.*

Name of the Scheme.	Grant.	Expenditure.
	Rs.	Rs.
1. *Sugarcane Research Scheme*	81,200	75,593
Total ..	81,200	75,593
Deduct { Government contribution and	—22,808	—22,521
Deduct { Contribution from the Sugar Excise Fund ..	—12,458	—12,458
Net grant from the Imperial Council of Agricultural Research	45,934	40,614

Name of the Scheme.	Grant.	Expenditure.
	Rs.	Rs.
2. *Dry Farming Research Scheme*	45,567	45,543
Total ..	45,567	45,543
Deduct—Government Contribution	—12,841	—12,840
Net grant from the Imperial Council of Agricultural Research	32,726	32,703
3. *Cold Storage Research Scheme*	17,146	16,186
4. *Scheme for the Improvement of Marketing in India* ..	23,900	23,321
Total ..	23,900	23,321
Deduct—Government Contribution	—3,900	—3,793
Net grant from the Imperial Council of Agricultural Research	20,000	19,528
5. *Poultry Research Scheme*	8,547	8,319
Total ..	8,547	8,319
Deduct—Government Contribution	—299	—114
Net grant from the Imperial Council of Agricultural Research	8,248	8,205
6. *Sann Hemp Cultivation Scheme*	1,200	100
Total ..	1,200	100

Name of the Scheme.	Grant.	Expenditure.
7. *Sheep Breeding Scheme*	23,500	17,006
Total ..	23,500	17,006
Deduct—Government Contribution	—8,732	—8,732
Net grant from the Imperial Council of Agricultural Research	14,768	8,274
8. *Gas Storage Research Scheme*	400	393
9. *Scheme for investigation into Virus Diseases of Plants* ..	23,300	No expenditure was incurred as the Scheme was not started during the year.
Grand Total ..	2,24,760	1,86,461

(2) *Indian Central Cotton Committee.*

Name of the Scheme.	Grant.	Expenditure.
	Rs.	Rs.
1. Broach Cotton Breeding Scheme	9,636	8,216
2. Jalgaon Cotton Breeding Scheme	5,847	5,193
3. Surat Seed Distribution Scheme	12,985	10,386
4. Khandesh Seed Distribution Scheme	3,172	2,715
5. Benilla Seed Scheme on Deccan Canals	4,670	4,568
6. Survey of Goghari Cotton	1,250	1,106
7. Plant Puller Propaganda Scheme	4,430	1,981
8. Technological Assistant for Gujarat	4,675	3,912
9. Cotton Forecast Improvement Scheme	6,195	6,193
10. Defibration of Cotton Seed	1,750	410
11. B.D. 8 Cotton Seed Distribution Scheme	2,957	2,668
12. Estimation of effects on the cotton of the use of Plant Pullers	2,095	2,067
13. Revised Jayawant Cotton Seed Scheme	34,580	29,428
14. Revised Gadag No. 1 Seed Scheme	10,644	7,954
15. Clerk for Bombay Schemes	1,680	1,680
16. Cotton Wilt Breeding Scheme, Poona	10,222	9,800
17. Cotton Wilt Breeding Scheme, Surat	2,520	2,115
18. Dholleras Wagad Cotton Breeding Scheme at Viramgam	5,128	4,762
19. Jarila Seed Scheme	19,587	19,186
20. Inclusion of Northern and Western Cottons in Dry Farming Scheme at Bijapur	1,500	1,354
21. Schemes for the maintenance of Nucleus of improved varieties of cotton seed	2,320	1,559
Total ..	1,47,843	1,27,253

(3) *Sir Sassoon David Trust Fund (1937-38).*

	Rs.
(*a*) Further grant for the investigations in connection with the improvement of grazing lands ..	205
(*b*) Further grant for Linseed Research Scheme ..	2,903
(*c*) Further grant for Vegetable Research Scheme ..	4,449
(*d*) Further grant for research work on the wilt disease of Sann Hemp.	1,803
(*e*) Further grant-in-aid to the Vernacular Agricultural School, Dhulia	500
(*f*) Grant for the scheme for study of the Betel-vince Bug disease	3,140
Total ..	13,000

(4) *Village Improvement Scheme grants made by the Central Government.*

Name of the Scheme.	Grant.	Expenditure.
	Rs.	Rs.
1. Scheme for the Improvement of Poultry in villages ..	2,450	2,432
2. Scheme for the encouragement of Pedigree Poultry Keeping in villages	550	548

(5) *His Excellency the Viceroy's Livestock Improvement Scheme.*

Division.	Total amount of donations received from start till 31st March 1938.	Expenditure from start till 31st March 1938.	Balance on 31st March 1938.
	Rs.	Rs.	Rs.
Gujarat	19,257	6,282	12,975
North Central	40,585	16,023	24,562
South Central	11,785	5,644	6,141
Southern	12,657	3,314	9,343
Total ..	84,284	31,263	53,021

(c) Personal Ledger Account of the Director of Agriculture.

(100) The advance under the Director of Agriculture's Personal Ledger Account (Ordinary), placed at his disposal for financing the distribution of improved seeds, implement, etc., amounted to Rs. 1,83,000 including the temporary advance of Rs. 33,000 for financing the distribution and extension of improved varieties of cotton in Southern Division.

The total advance made during the year under report was Rs. 97,106–1–5 and the recoveries made amounted to Rs. 1,19,287-14-3 as detailed in the following statement :—

Month.	——	Advances.	Recoveries.
		Rs. a. p.	Rs. a. p.
Opening balance on 1st April 1938—	As shown in the last report.		1,31,392 9 1
	Subsequent adjustment.		+431 3 7
	Total ..	..	1,31,823 12 8
1937			
April	....	57,760 0 0	6,642 12 7
May	....	16,794 0 0	7,523 2 3
June	....	6,523 14 0	68,246 2 0
July	....	3,113 7 0	8,140 6 9
August	....	5,063 9 0	9,013 1 1
September	....	2,184 7 0	7,908 14 11
October	....	797 13 8	3,192 9 11
November	....	921 4 9	2,081 1 2
December	....	22 4 9	1,364 7 8
1938			
January	....	516 6 0	1,619 15 10
February	....	1,650 0 0	5,314 12 8
March	....	1,758 15 3	2,755 12 0
	....	97,106 1 5	1,23,803 2 10
Deduct profit earned and credited as Departmental Receipts ..	....	....	—4,515 4 7
	....	97,106 1 5	1,19,287 14 3
Closing balance on 31st March 1938 ..	....	1,54,005 9 6	....
Total ..	....	2,51,111 10 11	2,51,111 10 11

B. S. PATEL,
Director of Agriculture,
Bombay Province, Poona.

APPENDIX A.

List of Taluka Development Associations organised up to date.

According to the scheme laid down in Government Resolution No. 3378, dated 5th June 1922, Revenue Department, the number of Taluka Development Associations was 102 at the close of the year 1937–38 distributed over the Divisions of the Bombay Province as shown below :—

Division.	District.	Number.
Gujarat	Surat	3
	Ahmedabad	1
	Kaira	4
North Central	East Khandesh	12
	West Khandesh	8
	Nasik	5
	Thana	3
	Kolaba	2
South Central	Poona	10
	Ahmednagar	12
	Satara	12
	Sholapur	7
	Ratnagiri	8
Southern or Karnatak	Belgaum	4
	Bijapur	2
	Dharwar	7
	North Kanara	2
	Total ..	102

Subsidies amounting to Rs. 40,840 were granted during the year under report (1937–38) as against Rs. 37,879 granted in the previous year.

The Associations have been classed by the Divisional Boards of Agriculture in order of merit as under :—

Class " A "—The most successful or efficient.

Class " B "—Struggling Associations which deserve help if possible.

Class " C "—Moribund Associations.

Accordingly the number of Associations in each class is as under :—

Division.	Class.		
	A.	B.	C.
Gujarat	..	..	..
North-Central	..	..	..
South-Central	..	..	..
Southern	..	..	..
	—	—	—
Total ..	..	..	..

APPENDIX B.

Summary of Work done at the Poona College of Agriculture for the year 1937–1938.

This is the 30th year of the College.

Staff.

A post of Forestry Instructor is created from 1st June 1938 and the present strength of staff including this post is 28. Mr. D. G. Sane, B.Ag., has been appointed to this post, as a temporary measure.

Principal V. G. Gokhale retired from service on 9th March 1938 and Mr. B. S. Patel, B.Ag., N.D.D., N.D.A., took charge of the post of Professor of Agriculture and Principal, College of Agriculture, Poona. He held this post from 10th March 1938 to 24th May 1938 on which date I took charge from him as he was appointed to act as Director of Agriculture, Bombay Province, Poona.

Mr. H. G. Baluch, Assistant Professor of Dairying, has been appointed as Deputy Director of Agriculture, Gujarat, Surat, since May 1938 and Mr. M. M. Desai is appointed in his place since June 1938.

Mr. L. S. S. Kumar, Professor of Botany, was on deputation from 15th June 1937 to 18th September 1937 when Mr. V. M. Chavan, Assistant Professor of Botany, acted for him and Mr. S. R. Godbole acted as Assistant Professor of Botany. Mr. V. M. Chavan, Assistant Professor of Botany, was on leave from 6th May 1938 to 30th May 1938.

Dr. J. A. Daji, Professor of Chemistry, was on leave from 8th May 1938 to 9th June 1938 when Mr. N. Narayana, Assistant Professor of Chemistry, acted in his place.

There have been a few changes in the personnel of the subordinate Staff of Lecturers and Demonstrators.

Equipment.

There has been a good deal of improvement in the College Library during the year 1937–38.

In the last report it was stated that Government were pleased to sanction a special grant of Rs. 25,000, spread over five years for the equipment of the College Library. This year the first instalment of Rs. 5,000 was sanctioned. Actually Rs. 4,800 were received.

In all 219 books were added to the Library. This brings the total number of books to 7,939 apart from periodicals of which we have nearly 12,000 volumes.

The work of classification and arrangement of books is in progress.

As per Government Resolution, Revenue Department, No. 5299-33, dated 16th May 1936, the Government was also pleased to give a special grant for equipping the various College Laboratories during the year under report and the same was spent on purchasing Laboratory apparatus.

Curricula.

From the College year commencing in June 1938, a Forest Ranger's Class has been started, wherein some of the science courses are taught by the College Staff and the Forestry part is taught by the Forestry Instructor.

Student-ship.

The number of students that attended during the year was as follows :—

Class.	First term.	Second term.
First Year in Science (Agri.)	69	70
Second Year in Science (Agri.)	57	56
B.Sc. (Agri.)	46	47
Total ..	172	173

Examination results.

The results of the First, Second and Final year examinations are given in the following table :—

Serial No.	Examination.	Number appeared.	Number passed.	Percentage.
1	First year Science (Agri.) ..	86	43	50
2	Second Year Science (Agri.) ..	63	55	87·3
3	Bachelor of Science (Agri.) ..	56	49	87·5

Comparison with the Previous University results.—The percentage of successful candidates in the University examinations during the last three years is as follows :—

Examination	1936.	1937.	1938.
First Year Science (Agri.)	52·5	63·4	50
Second Year Science (Agri.)	57·1	88·3	87·3
Bachelor of Science (Agri.)	No. examination in this year.	65·7	87·5

The better performance in the year under report in the final year result can be attributed to a probably more severe test in the first year in 1936, and low percentage in the first year result is due to the lower calibre of students joining the College.

Post-graduate Degree Courses.

The position in this regard is explained in the following table :—

Name of Section.	For what degree.	Studying in				Examination	
		1st Year.	2nd Year.	3rd Year.	Total	Number appeared.	Number passed.
Agriculture ..	M.Ag.	Nil	1	Nil	1	Nil	Nil
Botany ..	Ph.D.	1	..	..	1	..	..
Chemistry ..	M.Sc.	2	..	1	3	..	..
Do. ..	M.Sc. (Agri.).	1	..	1	2	..	..
Entomology ..	M.Ag.	..	..	1	1	..	..
Do. ..	M.Sc.	2	..	..	2	..	..

Special Courses.

Special courses were offered as follows :—

Subject taught.	Number of Students.	Periods.
Dairy	5	2 months.
	5	3 ,,
	2	4 ,,
	4	1 month.
Plant Pathology	1	12 months.
Horticulture	1	1 month.
	1	2 months.
	1	3 ,,
	1	4 ,,
	1	5 ,,
	1	7 ,,
Agriculture	1	6 ,,
Chemistry	1	2 ,,
Botany	1	4 ,,
Veterinary	1	2 ,,
	1	3 ,,

Careers of Graduates.

With four members added during the year and 67 discontinued the number of registered members on the rolls of the Agricultural Graduate's employment Board is 28. During the year 15 enquiries were received from employing agencies, and these enquiries were circulated promptly to the registered members. The members, however do not care to inform the Board of their success in obtaining suitable employment through the agency of the Board.

Admissions for 1938–39.

For the Bachelor of Science (Agri.) degree course.—In all, 60 from the Bombay Presidency and 33 from outside Bombay Presidency duly qualified candidates applied for admission to the first year class. The latter included 18 from Sind alone. All were given admission. But only 51 from the Bombay Presidency and 14 from outside Bombay Presidency including 10 from Sind actually joined against the total of 71 in the last year. The educational standard of the new applicants from the Bombay University is above that in the last year, about 31·25 per cent. as against 25·8 per cent. of last year having scored above 40 per cent. in their First Year in Science examination. All those who have come from Universities other than Bombay have to pass Intermediate examination in Science.

The uniform dress of Khaki short and shirt for students was continued.

For Post-Graduate Degree Courses.—No student has been registered for the post graduate course during the First month of the new session in the year under report.

For Special Courses.—Nine students have been admitted in the following courses :—

Subjects.	Number of students.
1. Agriculture	5
2. Plant Pathology	1
3. Chemistry	1
4. Dairy	2
	9

Scholarships.

The number of scholarships for 3 years continued to be the same as in the previous year viz. 5 for backward Classes including Mohammedans and 3 for General Competition in each of the 3 classes.

The Students' Hostel.

The total number of students accommodated in the Hostel is 129, whereas there is accommodation for 132 students.

Physical, Sporting and special activities—The College Gymkhana.—Professor L. S. S. Kumar continued to be the Chairman throughout the year except when he was out of India on deputation from 15th June 1937 to 18th September 1937 when Professor V. M. Chavan acted for him.

The students took part in the usual activities of the Gymkhana. The College did not fare so well this year in the Inter-Collegiate tournaments as compared with previous years. The only trophies won were the first prizes in one hundred and two hundred and twenty yards swimming competitions.

The management of the hostel electric installation is vested with a sub-committee of the Gymkhana Managing Committee. The students have benefitted by the electrification of the hostel.

The University Training Corps.—The U. T. C. platoon No. 6 of the College of Agriculture, Poona was in charge of Lieut. V. M. Chavan and Sergeant J. R. Chitnis was the platoon sergeant throughout the year. In all there were nine Non-commissioned officers and thirty Cadets.

The annual Camp was held during X'mas at Pashan. No. 6 platoon attained an exceptionally high standard of effeciency. At the camp the platoon fared very well in attack and defence tactics, and night patrols. In the non-commissioned officers' examination, held at the camp, out of eight candidates from this platoon, four were successful, and three got exemptions in two, out of three subjects. Captain Talnikar stood first in the Sergeant's examination.

In the Battalion Sports No. 6 platoon won prizes in boxing, wrestling, volley ball, basket ball, japense race 100 yards, relay, and stood very high in the Battalion Cross country race. C. Dewal won a boxing Championship belt for his platoon after a long time.

In the " B " Company Sports, the platoon did very well and for the fourth time in succession the platoon carried away the company shield for Hockey. In the annual shooting competitions No. 6 platoon stood first in parts III and IV. In the musketry competition for new men, in the platoon, C. Mhatre and C. Kavaloor stood first and second respectively, while among the trained soldiers, L/Cpl. Joshi B. P. carried away the first prize.

No. 6 platoon had the unique honour of winning the shield of platoon efficiency of the " B " Company, for the first time, this year. The above splendid record goes to the credit of every member of the platoon. Lieut. Chavan is promoted to the rank of second in command " B " company, and a new platoon commander from the College of Agriculture, Poona, will have to be appointed, during the coming year.

The Rovers.—The Agriculture College Rover Crew was in charge of Professor J. P. Trivedi, also a senior member of the staff who is the Assistant Provincial Scout Commissioner, Central Division. They had a good programme last year.

The Social Gathering.—The Annual Social Gathering of the past and present students and staff was held under the presidentship of the chief guest the Honourable Mr. Morarji Desai, Minister for Revenue and Agriculture.

A unique feature of the function was his speech which was delivered in Hindi for the first time in the history of the College Social Gathering. In his speech the Honourable Minister advised the students to pay more and more attention to the practical side of their course and adopt a simpler way of living so as to be able to mix freely with the cultivators and win more and more of their confidence.

Students' Literary activities.

The Poona Agricultural College Magazine.—The Agricultural College Magazine completed its 29th Year successfully, Professor N. Narayana being the staff editor in the year under report. 16 original articles were published and the response was very encouraging. The number of subscribers went up to 350 an increase of 45 over the previous year. 20 Indian and 11 Foreign scientific periodicals were exchanged with this magazine. The financial aspect of the Magazine remains sound as before.

Students' Guardianships.

This was continued. Its usefulness and appreciation were determined by the interest and influence the tutors were able to exert.

Aid and Assistance to the Public.

Veterinary Hospital.—Apart from the main purpose of practical instructions to the students of the College, it has continued to help the public as in the past.

The number of in and out patients during the year was 536 and 5,493 respectively as against 462 and 5,050 respectively in the previous year.

There was an out-break of Ranikhet disease amongst the fowls of the Government Central Poultry Farm Poona and the officer in charge of the Agricultural College Veterinary Hospital rendered useful help.

Rural Reconstruction.

Nineteen students and some members of the staff of this College took part in the rural reconstruction work of the Rural Reconstruction Association of Poona City during the vacation in October 1937.

A few students also offered their services as instructors in Bunding Classes held in the South Central Division during May.

Special Classes.

During the year under report short training in Agriculture for few weeks was given to the following members of the various Government Departments :—

(1) Staff of the co-operative department under training.

(2) Rural Reconstruction Army, Poona.

(3) Reservists of the Royal Bombay Sappers and Miners, Kirkee.

(4) Honorary Agricultural Agents of the Poona District.

By a Government Resolution No. 6247/33, dated 16th March 1937, Revenue Department, it was decided to give a general training in Agriculture to a small number of Assistant and Deputy Collectors every year. Accordingly 5 Assistant and Deputy Collectors attended the class in September 1937. The class was held from 13th September 1937 to 23rd September 1937.

Research and Advice.

The function of this institution is no less of research and advice than of teaching. In fact about 60 per cent. of the total budgets of the sections at the College is spent on research and advice.

All the staff of the College have carried on research and advisory work in the time available after satisfying the needs of teaching and administration of their respective sections. Summaries of such research and advisory work are embodied in the reports of the respective Heads of Sections which are appended to the Annual Report of the Department.

Visitors.

Amongst the 26 visitors including 13 students' parties the following may be prominently mentioned :—

1. Messrs. Russell and Gough, Members of the Bombay Legislative Assembly.

2. Honourable Mr. Morarji Desai, Minister for Revenue and Agriculture, Province of Bombay.

3. Mr. M. S. Mandanna, Assistant Commissioner and District Magistrate, Coorg, with his friends.

4. Mr. A. G. Beattie, Director of Agriculture, Nigeria.

5. Dr. R. A. Fisher., M.A., Sc.D., F.R.S., Rothamsted Experimental Station, Harpenden (England).

6. Dr. F. Crowther, of the Imperial Chemical Industries.

7. Dr. J. D. Tothill, Director of Agriculture, Uganda.

Corruption.

Strict supervision is kept on the work and general behaviour of the subordinate and there has been no case of corruption in the year under report.

V. A. TAMHANE,
Principal,
College of Agriculture, Poona.

Dated the 20th July 1938.

Programme of work for the year 1938-39.

ADMINISTRATION AND CONTROL OVER THE TEACHING ACTIVITIES, WELFARE OF THE STUDENTS OF THE COLLEGE, AND READJUSTING THE SYLLABUS OF STUDIES SO AS TO GIVE MORE PRACTICAL TRAINING TO THE STUDENTS IN FARM OPERATIONS.

V. A. TAMHANE,
Principal,
College of Agriculture, Poona.

POONA, Dated the 20th July 1938.

APPENDIX C.

Summary of Work done under the Deputy Director of Agriculture, North Central Division, for the year 1937-1938.

(Thana, Kolaba, Nasik, West Khandesh and East Khandesh.)

I. SEASON.

In the districts of Thana and Kolaba, monsoon commenced rather late, in the second week of June and continued in heavy showers till the end of July. This prolonged heavy rain interfered with sowing of rice, and damaged rice seedlings. Transplanting was done under favourable conditions, and the light rainfall of August and the first week of September promoted good tillering. Again, good rains in September helped the crop till maturity. Yields of rice were normal to above normal. Crops grown on varkas lands also yielded well.

In Khandesh, monsoon broke out rather earlier in the third week of June but the currents were weak and erratic for nearly a fortnight. Sowings were, therefore, carried out in anticipation of more rain or were required to be delayed in the greater part of the district for want of sufficient moisture in the soil. The monsoon strengthened in July and sowings could be completed by about the middle of the month. This was followed by heavy rains which prolonged up to the end of the first week of August causing damage to young crops due to excess of moisture and over-growth of weeds. The rest of August and the first week of September were practically dry and the crops began to wither particularly in lighter soils. Rains hereafter were universal and well distributed. These gave considerable vigour to the standing crops and helped their proper maturation. Late rains in October were received over the greater part of Khandesh except in central East Khandesh and rabi crops of wheat and jowar were sown under optimum soil conditions. Their further growth was nearly normal except in Jalgaon and Amalner. In West Khandesh kharif rains were unusually heavy in north-western talukas and caused damage to all crops and lowered their yields.

In central and western Nasik, rainy season commenced pretty early, in the second week of June, and continued in light to moderate showers till the end of the month. Rainfall in July was satisfactory and the sowing of bajri and transplanting of rice and nagli were carried out under favourable conditions. During August, rains ceased for nearly three weeks and caused anxiety. This was relieved by the timely rains in September which also facilitated the preparation of land for rabi crops. Further, rains were received in the first fortnight of October and rabi sowings were done under optimum moisture condition in the soil. Some rains were also received early in November. These were beneficial. Intensity of cold, however, was not severe enough for the normal growth of rabi crops.

Due to late sowing followed by prolonged heavy rains in July and the long drought of August the yields of cotton and groundnut were 20 to 25 per cent. below normal. Kharif jowar gave heavy yields but bajri gave about 10 per cent. less than normal. Niger and sesame yielded about 20 per cent. below normal. Rabi jowar yielded well in Khandesh but was about 20 per cent. below normal in East Nasik. The yield of wheat was also affected by the absence of the usual intensity of cold and occurrence of cloudy spells, by about 20 per cent.

Pests and diseases of crops did not appear in severe forms. Wilt on cotton was far too less severe, while that on betelvine in Bassein was virulent. Wingless grass-hoppers appeared in Niphad in some villages and damaged the crop of bajri. Wheat in Khandesh showed attack of Fusarium wilt, which reduced plant population by 10 to 20 per cent. In stray places rats were also reported. The wheat crop was free from rust in Nasik under both irrigated and dry croppings. Grass-hoppers appeared in Chandor in April and damaged the fodder crop of irrigated jowar. These however disappeared due to the early advent of rains in May.

Hoppers and mildew on mango were reported from all over Thana and Kolaba which caused damage to the already small crop.

The condition of cattle was satisfactory and the supply of fodder and drinking water was adequate.

Cotton suffered a heavy fall in its prices from Rs. 15 to Rs. 16 per maund of 168 lbs. in the previous year to Rs. 10 to Rs. 11 during the year under report. The same also happened in the case of groundnut which came down from Rs. 14 to Rs. 15 of the previous year to Rs. 10 in the current year. Grain crops fetched more or less the same prices as in the previous year and the high level of the price of wheat was maintained. Price of gul during the harvest season ruled as low as Rs. 9 to Rs. 10 per palla of 240 lbs.

The economic condition of the agriculturist continues to be unsatisfactory due to the heavy fall in the prices of cotton, groundnut and gul and also due to the general rise in the cost of living. Labour rates have not fallen proportionately with the fall in prices of agricultural commodities.

II. RESEARCH AND EXPERIMENT.

COTTON.

1. *Plant Breeding Work.*—As mentioned in last year's report the Khandesh Cotton Breeding Scheme has been extended for a period of five years and the following is the report of the work done in the first year.

The promising strains of Neglectum Verum, viz. N.V. 56–3 (now named Jarila) and N.V. 56–17 referred to on page 68 of last year's report, were given rigid yield trials in replicated plots on Jalgaon,

Bhadgaon and Dhulia Farms. N.V. 57–7 being defective in growth and not being suited to adverse climatic conditions prevailing in Khandesh and also being rather an early type, was dropped from the trials and two new selections from Verum, viz., N.V. 56–4 and N.V. 201–3 were included. The controls used were Banilla and N.R. 6. On Bhadgaon Farm, two trials were taken, one after groundnut and the other after bajri rotations. Detailed results would appear in Experimental Records. They show that Jarila was significantly superior in yield to N.V. 56–17, N.V. 201–3, Banilla and N.R. 6 at Jalgaon Farm and over Banilla and N. R. 6 in the trials on Bhadgaon Farm after groundnut rotation. After bajri rotation however, it did not differ significantly from the other strains. At Dhulia, it gave significantly higher yield over Banilla only. Reviewing the results of the four years' trials at Jalgaon and three years' trials at Bhadgaon and Dhulia, it is seen that in 70 per cent. of the trials, Jarila gave significant advantage over Banilla and in 61 per cent. cases over N.R. 6. As these trials were carried out for four years at Jalgaon and for three years at Bhadgaon and Dhulia, they will be discontinued from next year.

Village trials with Jarila and local cotton were carried out in duplicate plots of ten gunthas each, at 39 places all over the Khandesh tract. Jarila gave higher yield than the local in 18 trials, equal yield in 13 trials and less yield in 8 trials. The results on the whole were significantly superior to the local. The ginning percentage ranged from 32·5 to 36. Farm and commercial lint samples were subjected to Technological Laboratory and Mill Tests. The laboratory tests showed that the variety was capable of giving highest standard warp counts from 22 to 36. The mill tests carried out at Century Mills, Bombay, on a commercial sample of a bale of 440 lbs. gave 19·9 counts for an average test of 80 lbs. and the cotton was considered to be very good except for its leafiness. The prices obtained at auction sales for cotton pooled at Jalgaon from cultivators, who had grown it on large scale, were quite encouraging and the premium obtained was Rs. 33 over Broach. The quality of high resistance to wilt was very significant wherever Jarila was grown in the district and especially in the highly wilt affected tracts.

The preliminary wilt survey undertaken during the year indicated the prevalence of wilt in parts of West Khandesh (up to now supposed to be a wilt-free tract), although it was of a sporadic nature in the lighter soils. Hybridisation of Jarila with N.R. 5 and Million Dollar was taken up during the year with the object of combining high ginning percentage and higher wilt resistance in Jarila. The work of isolation of more desirable and promising types than Jarila is being continued in the cottons brought from Chandur. The comparative flower study in the three varieties, Jarila, Banilla and N.R. indicated that Jarila produces 1½ times more flowers than any of the other two varieties and its boll formation was also decidedly superior to both. A nucleus of 100 lbs. selfed seed of Jarila was maintained at Jalgaon and Bhadgaon farms, during the year under report.

2. *Spacing Experiment.*—The spacing experiment with cotton was continued in 8 replications in one guntha plots. The spacings tried were the same as those of last year, viz., 18 and 24 inches between rows and 6 and 9 inches between plants. The control was the local spacing in which the usual 18 inches drill was used. Detailed results will be given in Experimental Records. The average yields of cotton per plot in different replications varied from 16·9 lbs. to 17·9 lbs. the highest being in the spacing 24″ × 6″. The differences are however not significant, thereby implying that wider or narrower spacings used in this experiment do not affect the yield materially. Last year, the yield with the spacing of 18″ × 6″ was significantly superior over all other spacings except over 24″ × 6″ which stood next to it in yield.

It may be concluded from these trials that cotton can be sown with wider distance of 24 inches instead of 18 inches of the local practice in the deep black cotton soil of the Tapti Valley represented by Jalgaon Farm. This would facilitate interculturing operations to be carried out more efficiently and would also effect some saving of seed. The reason advanced by cultivators for using a higher seed rate is to provide against adverse condition of soil moisture during and after sowing, resulting in lower germination. Village trials will have to be conducted over a series of years under cultivators conditions and under varying types of soils in Khandesh before widescale propaganda is undertaken. These trials would be laid out from the kharif season of 1939.

The spacing experiment on Jalgaon Farm will be discontinued.

3. *Cotton Manuring.*—The following experiment was carried out at the suggestion of the Director of Agriculture, Poona. The object was to see if decomposition of sann crop used for green manure, is hastened by the application of farm yard manure at the time of its incorporation with the soil and if thereby it produced greater effect on the succeeding crop of cotton in the following year. The experiment was laid out in Latin Square in two guntha plots with the following treatments :—

1. No manure.
2. Sann green manuring.
3. Sann green manuring with the addition of 10 cart-loads of farm yard manure per acre at the time of ploughing in the crop.
4. Farm yard manure at the rate of 10 cart-loads per acre applied at the same time as in No. 3.

The quantity of sann green crop ploughed in, was 1,356 lbs. in each plot. All the plots will be sown with cotton in the kharif season of 1938 and the effects noted.

Similar experiment has also been carried out on Bhadgaon Farm.

4. *Topping versus Non-topping of Cotton.*—This experiment was newly arranged in duplicate in plots measuring 3·33 gunthas each. The idea is to see if topping of plants increased the yield of kapas. The average yield of the topped plants per acre was 664 lbs. as against 643 lbs.

in the control. The difference is negligible. The experiment will be repeated.

5. *Improved Cotton Seed Drill.*—The trial of the improved cotton seed-drill was continued. This was done in two guntha plots in duplicate, the treatments being sowing of cotton-seed with local and improved seed-drills, the spacing between rows being constant, namely 18 inches. Wider distance of 24" was not tried. The average yield of the duplicate plots was 25·75 lbs. of seed cotton for the improved drill and 24·5 lbs. for the local drill. The difference is very small. Besides, while working, the wheels get clogged in the moist soil and are simply dragged leaving long gaps in the area sown. The drill, therefore, cannot be recommended and its further trials will be discontinued.

JOWAR.

1. *Jowar Breeding.*—As mentioned on page 70 of last year's report, the four selections of kharif jowar, viz., Nos. 17, 41, 44 and Salsingi, were tried in 8 replications along with the local variety in one guntha plots. In the early stage of plant growth, there was an attack of stem-borer but the plants recovered their normal growth later. The results will appear in the Experimental Records. They show that there was no significant difference in the yield of grain of any two varieties including the local. In the case of straw, strain No. 44 and Salsingi gave significantly higher values over the local. The trial will be repeated.

WHEAT.

1. *Sann Green Manuring.*—The experiment of growing a crop of sann for green manuring in the kharif season on the land for wheat in the following rabi season was continued. The lay out was ABBA and the number of replications were six with 2½ guntha plots. Green manure was grown in situ and the quantity added per plot was at the rate of 15,080 lbs. per acre. Detailed results of the experiment will appear in the Experimental Records. The results show that in all the replicated plots the yields of grain and bhusa are slightly lower in those receiving green manure than in the control. Last year, the average yields in the treated and untreated plots were almost equal. In Jalgaon and Amalner Talukas late rains in October were absent and there is a possibility that soil moisture was deficient for the decomposition of the green matter added. The experiment will be repeated.

2. *Improved Implements.*—The wheat seed-drill and the wheat thresher are now being used on the Jalgaon farm and also demonstrated to visitors. They will be taken out for demonstration in the district.

The winnowing fan was further tried. It winnowed and cleaned 951 lbs. of wheat in one hour as against 1,122 lbs. with natural wind of moderate intensity. Under strong wind 1,685 lbs. were winnowed in the same time. The advantage of the fan, however, is that it makes the cultivator independent of wind which is practically absent during December to April when the kharif crops and some of the rabi crops are threshed. Even during April and May, they are uncertain and, therefore, the winnowers have to waste time. Holding the harvested crop in

an unthreshed and unwinnowed condition for a long time is unsafe. The winnowing fan would, therefore, be a good asset to overcome these difficulties. Its price, Rs. 60, however, is beyond the limit of an average cultivator and arrangements to stock these for hire by Co-operative Organisations must be made.

RICE.

Manurial Experiment with Oil-Cakes.—This is the third year of the experiment. Castor cake and safflower cake were used as before, singly and in combination with a small quantity of sulphate of ammonia. Detailed results for 1937–38 will be reproduced in the Experimental Records. The three years' results are summarised below. In 1935–36 the area of each plot was one guntha replicated five times. In the latter two years it has been 1/100th of an acre but replicated eight times.

Statement showing the mean values of yield of paddy per guntha.

Treatment.	Yield per guntha mean of 5 replications. 1935–36.	Yield per gt. mean of 8 replications. 1936–37.	Yield per gt. mean yield 8 replications. 1937–38.	Average.	Per cent. increase.
	lbs.	lbs.	lbs.		
No treatment—Check plot ..	61·80	55·45	64·75	60·7	....
Safflower cake 40 lbs. N. ..	88·00	71·50	81·50	80·3	32·3
Castor cake 40 lbs. N. ..	93·80	64·50	85·25	81·2	33·7
Safflower cake 60 lbs. N. ..	93·00	79·00	87·00	86·3	42·2
Castor cake 60 lbs. N. ..	107·40	82·00	86·50	91·9	51·4
Safflower cake 50 lbs. N. and S. of Am. 10 lbs. of N.	98·20	83·25	91·75	91·1	50·0
Castor cake 50 lbs. of N. and S. of Am. 10 lbs. of N.	105·60	83·00	90·00	92·8	52·9

N.B.—N.=Nitrogen; S. of Am.=Sulphate of Ammonia.

1. In all the years the treated plots have given significantly higher yield over the control.

2. Application of higher quantities of nitrogen (60 lbs. N.) in any for of oil cake enhances the yield over the lower quantity (40 lbs. N.) but the increase is not statistically significant.

3. Substituting 10 lbs. of nitrogen in the form of sulphate of ammonia for an equivalent quantity of oil-cake, generally improves the yield but the increase is not significant.

4. Nitrogen in the form of castor cake has been generally found to be more effective than in safflower cake. The money returns and profits with castor cake are given below for the three years.

Statement giving financial position with castor-cake.

Treatment.	Cost of manure per acre.	Value of extra produce per acre.			Average.	Advantage per acre.			Average.
		1935-36.	1936-37.	1937-38.		1935-36.	1936-37.	1937-38.	
	Rs.	Rs.	Rs.	Rs.		Rs.	Rs.	Rs.	
Castor cake 40 lbs. Nitrogen.	23	34	31	43	36	11	8	20	13
Castor cake 60 lbs. Nitrogen.	34	47	45	64	52	13	11	30	18

Although the net profit with the application of 60 lbs. of nitrogen is higher, than that with 40 lbs. the increase is not statistically significant. It is safe to recommend the application of 40 lbs. nitrogen in the form of castor cake.

This experiment would be discontinued and village trials started from next year.

III. AGRICULTURAL SERVICE AND PROPAGANDA.

PREVENTION OF SOIL EROSION.

The anti-erosion campaign referred to on pages 71 and 72 of last year's report was continued with good progress.

In Nasik District, an area of 2,966 acres was got protected against erosion by bunding, under departmental guidance. Out of this, 1,759 acres were done in Yeola Taluka alone with a total length of 221,787 feet of bunds in 26 villages. In Niphad and Chandor the area protected was 240 acres in ten villages with bunds measuring 17,325 feet long. In Malegaon and Nasik divisions, bunds were raised on an area of 967 acres in 44 villages.

The importance of this fundamental improvement, namely, conservation of soil, is being steadily recognised by the people and there has been some voluntary effort in copying the bunding work. It is estimated that an area of about 2,500 acres was protected in this way in the district during the year as a natural extension.

The District Village Improvement Committee, Nasik, has allotted a sum of Rs. 4,000 spread over three years for promoting this activity. Out of this, an amount of Rs. 800 was spent on the pay of seasonal bunding kamgars, fuel for the tractor used for laying out basic bunds in Yeola, and purchase of kenis (wooden scrapers) which are given free of charge for raising bunds.

In West Khandesh, an area of 1,300 acres was protected against erosion in Sindkheda and Dhulia Talukas. The District Village Improvement Committee in this district, also, has allotted a sum of Rs. 3,700 spread over five years. The expenditure incurred during the year amounted to Rs. 510 on pay of bunding kamgars and khalashis.

In East Khandesh, 237 acres were got bunded in Jalgaon and Jamner Talukas. The Taluka Development Associations in this district have commenced to carry on propaganda and as a result an area of 496 acres was bunded. The District Village Improvement Association has sanctioned a sum of Rs. 5,000 spread over five years for promoting this activity and an amount of Rs. 126 was spent during the year of the report.

The total area bunded in this division thus comes to 4,503 acres under departmental guidance and that under natural spread is estimated to be 3,000 acres including the area protected as a result of the propaganda carried out by Taluka Development Associations in East Khandesh.

Training Classes in Bunding.—Taking into consideration the vastness of the agricultural lands that are subject to constant erosion of soil, and therefore, in need of immediate protection by bunding, it is essential to have the assistance of a large number of trained non-official workers in the country-side, if the improvement is to extend rapidly. With this end in view, Government sanctioned a sum of Rs. 13,000 for the training of agriculturists in scientific methods of bunding so that the trained persons would be able to survey their own fields, fix the alignments of bunds and positions of waste-weirs and construct them without further assistance from the departmental staff. Not only that, but they would also be able to render help to others in these directions and carry on propaganda in their localities. Accordingly, two bunding classes were held in the months of April and May 1938, at Meherun in Jalgaon Taluka and Andarsul in Yeola Taluka. Each class occupied a period of a fortnight. The attendance at Meherun class was 170 and that at Andarsul was 101. Arrangements for the boarding and lodging of the attending agriculturists were made at Government cost. They were also shown typical bunding works for which conveyance charges were paid from the scheme.

Mornings and after noons were devoted to practical training, for which the class was divided into small batches ; about an hour in addition was spent in explaining the whole subject of the hows and whys of soil-erosion and the various methods of control. At night, magic lantern lectures were arranged on the subject of soil erosion and in solving difficulties and discussions on the work done. The students showed great appreciation about the training given to them in the theory and practice of erosion-control and it is expected on return home they would fulfil the object of the training. These classes would be continued in the fair season next year at different centres with a smaller number of students at each place.

All members of the departmental district staff attended these classes in the respective districts and helped in the practical training of batches of students. Side by side, their knowledge of the subject was brought up to date. Taluka Development Associations had also sent their Fieldmen to attend the bunding classes.

IMPROVEMENT OF SOIL FERTILITY.

Efforts to educate the people to increase the supply of organic bulky manure in different forms and apply the same to the soil to improve its fertility, were continued with the following response :—

1. *Farm Yard Manure.*—Generally, the voidings of cattle and the litter, are heaped on the ground outside the village in the Deccan districts. Propaganda tc store these in pits and spread them evenly therein, so as to create conditions necessary or uniform decomposition, has been in progress. It has also been an item of propaganda in the Village Uplift Scheme. During the year under report, 343 new pits were made in 35 centres in the Bhusaval section and 175 in Chopda and Erandol of East Khandesh, 473 pits in 40 places in West Khandesh and 178 pits in Nasik.

2. *Compost Manure.*—Propaganda for the utilisation of all kinds of farm refuse for turning them into compost manure was continued and as a result the cultivators prepared 2,222 cart loads of the manure in Bhusaval section in 42 villages on 55 farms. The compost-man employed from the village uplift grant attended, in addition, seven private farms and actually prepared 250 cart-loads. In West Khandesh and Nasik; the work is still in the demonstration stage and it is hoped that people would take to this important practice. Compost making was demonstrated at 15 places in West Khandesh and at ten places in Nasik.

3. *Sann Green Manuring.*—In East Khandesh, a quantity of 9,729 lbs. of sann seed was distributed in the kharif season of 1937 for green manuring from the stock of the District Village Improvement Committee. Besides, a quantity of 24,105 lbs. was distributed by the Taluka Development Associations and the district staff.

In West Khandesh, the distribution of sann seed was continued on the same plan as appearing on page 74 of last year's report and 20,800 lbs. of seed were distributed at the concession rate, of 75 per cent. of cost price, the difference being debited to the grant of Rs. 500 allotted by the District Village Improvement Committee in 1935-36.

In Nasik, the use of sann green manuring is further extending on irrigated farms in Sinnar, Niphad and Nasik Talukas and 120,200 lbs. of sann seed was purchased by cultivators. Propaganda has also been begun in the irrigation tract commanded by the Girna Left Bank Canal in Malegaon and 1,971 lbs. of sann seed was distributed.

4. *Bone Manure.*—Charring of bones to make them brittle for easy crushing for use as manure was demonstrated at 20 places in East Khandesh and 12,910 lbs. of powdered bone was prepared. In West Khandesh, the process was shown at 13 places and 985 lbs. of manure was obtained. In Kolaba, 1,160 lbs. of bone were powdered by this method.

Some people prefer to obtain bone-meal from factories. The quantities so obtained for manurial use were 7,573 lbs. in East Khandesh, 1,973 lbs. in West Khandesh, 2,774 lbs. in Nasik and 10,680 lbs. in Kolaba.

5. *Artificial Fertilizers and Oil-cakes.*—The Imperial Chemical Industries have organised a net-work of their agencies in the Division and they effect very large sales of commercial fertilizers amongst which sulphate of ammonia is the most widely sold, chiefly for irrigated crops. The Taluka Development Associations are their main agents in several places and through them 215,778 lbs. of sulphate of ammonia was sold in East Khandesh, 270,522 lbs. in West Khandesh, 353,398 lbs. in Nasik, 369,440 lbs. in Thana and 13,545 lbs. in Kolaba. Niciphos is also getting steadily popular and the total quantities of this fertilizer distributed by the Taluka Development Associations was 11,461 lbs. This fertilizer is used for onions, chillies, etc. Nitrate of soda is also used by some cultivators and during the year 4,656 lbs. were distributed in small quantities in all the districts.

The use of groundnut and castor cakes is mostly made for sugarcane and to some extent for cotton. The Taluka Development Associations supply large quantities to their members. These were 525,152 lbs. in East Khandesh, 57,234 lbs. in West Khandesh and 61,880 lbs. in Nasik, and 2,743 lbs. in Kolaba.

6. *Common Salt.*—Advantage of the concession for denatured salt for manurial purposes given by Government is fully taken by owners of mango orchards in North Konkan. During the year under report 973 maunds of denatured salt was purchased in Thana, 702 in Bombay Suburban District and 778 in Kolaba, making up an aggregate quantity of 2,453 maunds. Last year this figure was 2,332 maunds.

SUPPLY OF SEEDS OF IMPROVED VARIETIES OF CROPS.

Jarila Cotton.—As referred to on page 75 of last year's report, a seed multiplication and distribution scheme for Jarila cotton was launched in Khandesh during the year under report. A quantity of 9,368 lbs. of pure seed was available on Jalgaon farm from the crop grown in 1936. From this stock, 6,868 lbs. of seed to suffice for 390 acres were distributed to reliable cultivators in concentrated areas for further multiplication in 1937 kharif season. The rest was sown on Jalgaon and Bhadgaon farms and on trial plots in villages. Besides, some of the cultivators in the district who had grown Jarila cotton in 1936 season were careful enough to stock the resulting seed and distribute the same. It is estimated that an area of 525 acres was covered by this natural spread. Thus the total area under Jarila cotton in Khandesh in the year under report was to the tune of 1,050 acres.

In 1937, selfed seed of Jarila (Stage I) was produced on Jalgaon and Bhadgaon farms under special finance from the Indian Central Cotton Committee. The quantities produced on these two farms were 100 and 373 lbs. respectively. The selfed seed will be multiplied there in 1938.

Stage II was organised on the same Government Farms on 35 and 100 acres respectively and the resulting produce of pure seed weighing 9,000 lbs. and 25,800 lbs. respectively has been stocked for distribution in the inner reserved area.

The area under stage III was 390 acres. The crops were rogued and the resulting pure produce of cotton was pooled and ginned under departmental supervision and 50,315 lbs. of pure seed has been stocked for distribution in 1938 kharif season.

The seed-growers have reserved a quantity of 13,325 lbs. for their use. Thus the total quantity of controlled seed that would be sown in the kharif season of 1938 would be 98,480 lbs.

Banilla Cotton.—Even though the Jarila Cotton Scheme was launched distribution of Banilla seed was not altogether given up. It was continued in localities where it was in demand, as in Amalner, Shirpur, Malegaon and Nandgaon. A quantity of 241,695 lbs. of pure Banilla seed was stocked for distribution in these talukas but as the sowing rains were deficient in parts of Malegaon and Nandgaon, the quantity of 72,540 lbs. remained unsold there.

Private agencies like seed merchants, Purchase and Sale Unions, and landlords were also induced to stock and distribute Banilla seed which they did to the extent of 99,630 lbs. They also sent 98,994 lbs. of seed outside the division.

As usual, the Taluka Development Association, Jalgaon, stocked and distributed 68,898 lbs. of Banilla cotton seed.

Surat 1027 *A.L.F. Cotton.*—Surat cotton is grown in Nawapur taluka and parts of Nandurbar and Taloda talukas of West Khandesh. Here, pure seed was obtained from Bardoli centre and distributed. The quantity given out to seed growers in Nawapur was 29,189 lbs. to suffice for 1,944 acres. There was also some natural spread from the stock of seed of the previous year. This sufficed for about 3,056 acres. The total area in Nawapur, therefore, under 1027 A.L.F. variety was 5,000 acres.

In Taloda, only a small quantity of seed of 3,445 lbs. to suffice for 229 acres was given. The natural spread under this variety in Taloda and Nandurbar was about 1,771 and 700 acres respectively.

WHEAT.

As reported on page 75 of last year's report, the improved varieties of wheat under distribution are :—

(1) No. 224.
(2) No. 168.
(3) No. 808 and
(4) Pusa No. 4.

The policy of multiplying the seed in successive stages on Government farm, private seed farms and registered seed-growers was continued. Owners of private seed farms were given pure seed worth Rs. 2 per acre as subsidy, on condition that they would rogue the crops and harvest and thresh the produce separately, to maintain purity. Seed from these farms was distributed to registered seed-growers.

1. *Wheat No.* 224.—This is being spread in East Khandesh. 6,180 lbs. of pure seed from Jalgaon farm to suffice for 108 acres was given out for multiplication on 12 private seed-farms in the district. The produce from these farms amounting to 29,860 lbs. was supplied to village seed-growers to suffice for 489 acres. A quantity of 65,602 lbs. of seed from seed-growers was further distributed for general crop. Natural spread also took place among cultivators and the total area under this variety in East Khandesh was to the tune of 10,000 acres as against 7,000 of last year.

The quantity of seed shown as distributed departmentally contains the stock of seed weighing 40,512 lbs. purchased from the grant of the District Village Improvement Committee in the year 1935-36. This quantity is turned over annually by issuing it out on the system of return in kind with 12½ per cent. increase.

2. *Wheat No.* 168.—Distribution of this wheat was continued in West Khandesh. 17,400 lbs. of pure seed of this variety from Jalgaon farm sufficient for 290 acres was distributed for multiplication on 13 private seed farms. The produce from this was given out to village seed-growers amounting to 59,265 lbs. sufficient for 990 acres. The quantity distributed for general cultivation was 125,085 lbs. sufficient for 2,085 acres. There was considerable natural spread and the total area under this improved variety was about 19,000 acres, as against 6,500 acres in the previous year.

An amount of Rs. 259 was paid as subsidy to seed distributors from the amount of Rs. 990 ear-marked by the District Village Improvement Committee. Last year, this was Rs. 112 only. The rate of subsidy was Rs. 1-8-0 per *map* of 720 lbs. distributed.

3. *Wheat No.* 808 (*Bansipalli*).—This improved variety is under distribution in the Nasik district. 685 lbs. of pure seed was obtained from Jalgaon farm and was sown on the private seed farms at Babhulgaon in Yeola taluka. The produce measuring 5,340 lbs. was distributed to 8 village seed growers for further multiplication, 6 of which were in Yeola and 1 in Niphad and 1 in Chandor. A quantity of 48,080 lbs. from these seed growers was distributed for general cultivation. Similarly, 16,584 lbs. of seed of this variety was distributed in other talukas such as Nandgaon, Baglan, Nasik and Sinnar. The total area under this improved variety was about 8,000 acres. In the previous year also the area was the same.

The spread of this variety is not progressing fast for the reasons given in the last year's report namely, its less tillering character, more

susceptibility to cold winds and climatic changes which affects the size of the grain and makes it spotted. Observations and opinions collected from cultivators show that this variety would continue to be grown in parts of Yeola, Sinnar and Nandgaon talukas. Cultivators in Nasik, Dindori and parts of Niphad are still undecided about the suitability of this variety.

4. *Wheat Pusa No.* 4.—Distribution of this variety was continued in irrigated areas of the three districts of Nasik, West and East Khandesh.

In Nasik, the quantity of 320 lbs. of pure seed of Pusa 4 was obtained from Karnal in the Punjab and distributed to 4 private seed farms. The resulting produce of 5,360 lbs. was distributed among village seed growers. The quantity distributed for general cultivation was 9,460 lbs. This wheat has now practically replaced the local Mondhya variety in North Nasik and the policy now is to maintain a small flow of pure seed grown in successive stages under departmental supervision. The estimated area under this variety in Nasik in 9,500 acres.

In West Khandesh, a quantity of 544 lbs. of pure seed obtained from Karnal in the Punjab was given out for multiplication on four seed farms. Some preserved pure seed was also grown and the resulting produce of 11,722 lbs. was stocked from Director's Personal Ledger Account and distributed to village seed growers. For general cultivation a quantity of 29,575 lbs. was distributed. The total area including natural spread under this variety is about 3,000 acres. The District Village Improvement Committee gave an amount of Rs. 16-7-0 by way of subsidy to distributors of seeds.

In East Khandesh, the stock of 1,522 lbs. of seed from the grant of the District Village Improvement Association, East Khandesh, was given out on return system with 12½ per cent. increase to ten cultivators in nine villages in Jalgaon taluka, and the Taluka Development Association distributed 8,428 lbs. The estimated area including natural spread of this variety is 1,000 acres.

The total estimated area under Pusa No. 4 wheat in the division comes to 13,500 acres.

Other seeds.

1. *Akola Bajri.*—Considerable area in the three Deccan districts, of this variety is grown from local produce but as bajri is highly cross fertilised, problem of maintaining the purity of seed is very difficult. Some seed is annually obtained from Akola tract but the quantity is very small. With the establishment of Taluka Agricultural Demonstration Stations, it is proposed to create small zones of Akola bajri round about these stations by perpetual renewal of pure seed from Akola. The resulting produce from the centrally situated fields in this zone will be used for further distribution. It would be possible to adopt this plan from 1939 kharif season.

2. *Maldandi Jowar.*—This has been under distribution in West Khandesh as a rabi crop. Its spread, however, is slow as the variety matures later by 10 to 15 days. 292 lbs. of pure seed was obtained and distributed for further multiplication on 40 acres. 3,457 lbs. of seed was distributed for general cultivation. The variety has spread over an area of about ,4000 acres. In the preceding year the area was 2,330 acres.

3. *Nialo Jowar.*—This variety matures about a fortnight earlier than the local rabi variety in West Khandesh. This has been under trial for the last four years and some people have taken to it. During the year under report 244 lbs. of pure seed was supplied for multiplication on an area of 39 acres. It is estimated that an area of about 700 acres was under this variety. In the previous year, it was only 200 acres.

RICE.

Improved varieties of rice continued to be distributed in the districts of Thana and Kolaba. Pure seeds of the improved types were grown as usual at the Rice Research Station, Karjat, and on the seed-multiplication farm attached to it. The total area of the two farms is only 14 acres and the supply of seed is, therefore, limited. The distribution work for each variety is detailed below :—

1. *K.* 42.—This variety is mainly suited to Kolaba and South Thana but on account of the supply of farm seed being limited, seed multiplication is organised in the talukas of Pen, Panvel and Karjat only. The number of seed-growers were 25, in each of Pen and Panvel and 21 in Karjat. A quantity of 6,007 lbs. of pure farm seed was issued for further multiplication to these seed-growers on an area of 172 acres and their crops were rogued. The produce from this was distributed to the extent of 9,571 lbs. only, to suffice for 273 acres. As a result of seed distribution carried out in the past for several years, this improved variety has become common in these talukas and the purity of seed is tried to be maintained by the flow of pure seed grown in two stages, as shown above. Rice cultivators in these districts generally preserve selected seed and this also helps to maintain the purity. The chief difficulty in the extension of this organisation is the inability of the cultivators to purchase seed on cash payment. They have been accustomed to get seed on return system in kind with interest.

2. *K.* 226.—This improved strain was under spread in North Thana, but as pointed out in the previous reports, its spread has been checked by the introduction of a finer variety by the trade called Surti Zinya. Efforts have been in progress to evolve a Zinya type. Very little seed of K. 226 could, therefore, be distributed and the area under it has been more or less the same, namely about 7,000 acres scattered over three talukas. Until a suitable strain of Zinya becomes available, the Surti Zinya will continue to be grown.

3. *K.* 540.—The spread of this variety has been in progress for three years and the variety has been popular as a mid-late variety in Thana.

In North Thana, 572 lbs. of pure seed from a reliable seed grower was given out for further multiplication on 14 acres, and 6,951 lbs. to village seed-growers, sufficient for 174 acres. 14,596 lbs. of seed was also distributed for general cultivation. The total area including natural spread under this type was about 6,500 acres. In the previous year the area was 1,850 acres.

In Kolaba this strain was under trial at 10 centres. In 8 of these, it gave appreciably higher yield than the local in 1 almost equal to local and in 1 less than local. Everywhere the improved variety impressed the people and the seed is in demand. During the year under report, 562 lbs. of farm seed was given out for multiplication on 14 acres and some seed spread naturally. The area under this variety in the district was about 200 acres. The total area in the two districts comes to 6,700 acres.

4. *K.* 184.—This is suited for high lying early rice fileds and is being distributed in North Thana. 495 lbs. of pure seed obtained from reliable seed grower, was given out for multiplication on 12 acres, and 1,682 lbs. were supplied to village seed-growers. Total area including natural spread was 1,600 acres.

5. *K.* 412.—This is suited for highly fertile fields near village sites where the local variety runs to leaf. The demand for it, is, therefore limited. Only 146 lbs. of pure seed was given out from Karjat Farm.

IRRIGATED CROPS.

Sugarcane.—The varieties of sugarcane under distribution are :—

(1) CO. 290,

(2) E. K. 28, and

(3) H. M. 320.

The variety CO. 290 is a high yielding, early and fairly frost-resistant. It is also adaptable to extremes of weather and environmental conditions. The only defect is that its gul tastes slightly saltish and on this account fetches less price. The experience of the people tends to show that the gul from the ratoon crop, as well as from crops grown on lighter soils is less saltish. Being a hardy variety, its cultivation would not be given up in areas of deficient water supply. The area under this variety during the year under report was 500 acres mostly in the talukas of Chandor, Malegaon, Satana and Sakri. It was also continued on the sugarcane farms of the Ravalgaon Sugar Factory on an area of 371 acres.

E. K. 28.—This variety is getting popular in Malegaon and Nasik sections and 4,200 and 8,080 whole canes were distributed during the year under report. These were purchased from the grant from the District Village Improvement Committee, Nasik, and have been given out on the system of return with 10 per cent increase. Besides, 3,800 canes were also supplied on cash payment. In 1936–37, the area under this variety

was 30 acres and it has extended to 250 acres during the current year. The Ravalgaon Sugar Factory has an area of 98 acres under this cane.

H. M. 320.—The chewing variety H. M. 320 continues to be grown on an area of 100 acres round about Nasik town. It is under trial in sugarcane centres near other towns where 1,550 canes were supplied.

Propaganda for wider planting and top dressing of sugarcane and the use of Poona furnace was continued and these improvements are spreading almost to all sugarcane farms. Six more Poona furnaces were constructed in Malegaon Taluka during the year under report.

Fodder Crops.—The area under lucerne continues to increase in all the three Deccan districts. The quantities of lucerne seed supplied was 1,645 lbs. in East Khandesh, 5,851 lbs. in West Khandesh and 1,457 lbs. in Nasik.

Vegetable Crops—The Taluka Development Associations stock and supply seeds of a variety of vegetable crops of brinjals, chillies, onion, tomato, bhendi, guvar, etc. The quantities so supplied were 4,731 lbs. in East Khandesh, 751 lbs. in West Khandesh, 10,824 lbs. in Nasik, 86 lbs. in Kolaba. In North Thana, 18,000 seedlings of vegetable crops were supplied to 172 cultivators in Dahanu Taluka.

DEVELOPMENT OF HYDRO-ELECTRIC TAIL-WATER VALLEYS.

As a result of the propaganda and the standing demonstrations of irrigated crops grown under the pumping plants at Kasap on the bank of the Patalganga in Panvel and the Balsar rahat at Vayal on the same river, there has been awakening among the residents in the valleys and there is a demand for more demonstrational pumping plants. One more such plant is proposed to be erected at Mohopada, in the ensuing year. Two applications for tagai loans for two pumping plants have also been received from Waveghar and Turade.

1. *Patalganga Valley.*—The area under the pumping plant at Kasap fitted up from the funds of the District Village Improvement Association, Kolaba, in 1936, increased from 7½ acres to the full working capacity of the pump,—14 acres and 10 gunthas. The principal crops grown were brinjals and chillies while tomato, cucurbits, onion and coriander formed minor crops. The expenses for crude oil, lubricating oil and the pay of the engine driver were borne by the irrigators. The prices of vegetables in the Bombay market, where the produce is sent ruled low and the margin of profit was comparatively less than last year. No charge is levied for the water in the river or for interest and depreciation on the engine and pump.

The Balsar rahat at Vayal was also fully worked by two cultivators who irrigated 2 acres and 10 gunthas under it and grew the same crops as at Kasap. Each of them realised a net profit of Rs. 35 for the period of five months of working.

2. *Kundalika Valley.*—The Agricultural Graduate, Mr. Bhaskare, continued to work on his farm on the bank of the Kundalika throughout the year and cultivated six acres under various crops like sugarcane, onions, garlic and vegetables. He has planted some mango grafts on the remaining area. He is industrious and carries on all cultivational operations in person with the help of two permanent servants. His farm would serve as a good centre for demonstration.

Two Balsar rahats out of the four purchased last year from the funds of the District Village Improvement Committee, Kolaba, were fitted up on the farms of Mr. Gujar and Mr. More. The former grew one acre of vegetable crops and the latter six acres of which two acres were under sugarcane. He had a mot in addition for irrigation.

3. *Pej-Ulhas Valley.*—The tail-water from the Bhiwpuri Hydro-Electric Power House is let into the Pej which joins the Ulhas few miles upstream from Neral. The owner of the irrigation farm at Karalewadi on the Pej has applied for tagai loan for fitting up an oil-engine, and he proposes to restart the work when the engine is fitted up. Under the Balsar rahat at Neral, Mr. Raje looked after the fruit plantation started last year and grew vegetables to the extent of 22 gunthas only. His chief handicap is capital.

4. *The Yeranzade Scheme.*—The Thana District Village Uplift Committee has sanctioned a sum of Rs. 10,000 for demonstrating the use of the tail-water for irrigation farming. The local difficulties in this valley are similar to those in the other two. Land on the bank does not belong to the cultivators, the absentee landlords have no interest in the development of the lands nor are they sympathetic in leasing them out on economic rents. The cultivators have neither capital nor knowledge and experience of growing irrigated crops. From the funds allotted, three pumping plants are to be installed in the valley and their use is to be given free to the cultivators for irrigation purposes.

The first such plant was erected on the bank of the Ulhas at Yeranzade near Badlapur on a Government piece of land measuring 12 acres. This was divided into 12 equal plots and given to 12 cultivators, on a nomical rent equal to land assessment. Each of them had taken up 2 to 4 partners. A vegetable gardener was appointed to teach the details of cultivation from day to day and he was stationed on the spot. The pay of the engine driver was also met from the Village Uplift grant. Cultivators paid the cost of crude and lubricating oils.

The net area cultivated was only 8 acres and 20 gunthas as the work was begun late. Thus each plot was of about 28 gunthas only. Out of this, 4 acres and 20 gunthas were under tomato, 1 acre and 20 gunthas each under each of brinjals and chillies and 1 acre under onion. Coriander was sown as a catch crop on about 6 acres. Planting was done between the 22nd of January and 12th of February 1938. Coriander was harvested in March and the other crops in April to mid-July.

The cultivators began the work well and continued to do it most enthusiastically until planting was over. Thereafter, their so called well-wishers frightened them with false notions that they will not be allowed to get the yield of the crops by the Government, and that they would lose in the concern and many such things. They, therefore, slackened their attention and neglected the crops which were overtaken by weeds, which grew luxuriantly with the applied manure and irrigation water. As however, they began to reap the produce and realised sale proceeds, they began to pay attention to the crops but it was too late. The net income per plot of 28 gunthas up to the middle of July 1938 after deducting the cost of marketing, varied widely from Rs. 60 to 185 depending upon the industry and attention to instructions. One cultivator got Rs. 185, five realised between Rs. 125 to 135, two got about Rs. 100 and four from Rs. 60 to 87. The average cost of irrigation worked to Rs. 47, including oils, driver's pay, interest and depreciation. This is too high as the area under the pump was only about half of its full capacity to irrigate. Taking into consideration the fact that the cultivators were absolutely new to irrigation farming, the results are encouraging and the signs are that all of the irrigators would work devotedly next year and reap full benefits.

This co-operative irrigation farm was visited by almost all the people of the surrounding villages within a radius of about 5 miles and a number of relatives and friends of the irrigators. The experiment was watched with keen interest. The success of the scheme has resulted in creating demand for more such pumping plants and it is proposed to erect the second plant in the coming year.

The irrigators were encouraged by the visits of officials and public, spirited men among whom may be mentioned the names of Mr. Jenkins, Director of Agriculture, Swami Anand, Mr. Jabir. A. Ali of Chembur, Mr. G. K. Phadke, M.L.A., Kalyan and Mr. M. P. Oka.

FRUIT CULTURE.

The area under fruit cultivation is increasing throughout the division and particularly so in East Khandesh. A very large number of budded plants and grafts was supplied to cultivators with the help of the Taluka Development Associations.

In East Khandesh, 44,345 plants of citrus varieties (santra, mosambi and lemon), 594 mango grafts, 170 chiku grafts, 105 pomegranate plants, 80 seedless guava seedlings and 1,050 bor buds of the reputed Meherun variety were supplied.

The Mali engaged from the funds of the District Village Improvement Committee, prepared 336 mango grafts, budded 505 jambori plants and 1,534 Meherun bor buds, and supplied 1,889 bor buds to the other four districts in the division, treated 200 trees against stem borer and demonstrated tree-pruning on 2,000 trees and prepared 30 chiku grafts.

The Horticultural Sub-Overseer worked in both East and West Khandesh. In East Khandesh, he prepared 286 mango grafts, budded 3,400 jumbori plants and 252 bor trees, supplied 1,325 bor buds to other districts in the division, gave advice in the selection of new sites for orchards at 4 places, gave 34 demonstrations of mango grafting, 4 of control of Gummosis, 2 of citrus stem borer, and one of eradication of white-ant. He visited 47 gardens for advisory work and showed pruning on 300 trees. He gave 18 lectures on horticultural subjects while touring with the Village Uplift Van and 12 magic lantern lectures.

In West Khandesh, 5,177 plants of citrus varieties, 340 mango grafts, 30 guava plants, 30 chiku grafts and 358 bor buds were supplied to cultivators. The Horticultural Sub-Overseer, prepared 45 mango grafts, budded 40 bor trees with Meherun bor buds, removed queen ant from 54 white-ant hills in five villages, visited 22 gardens for advisory work and supplied two secateurs. He demonstrated the use of paper bagging of citrus fruits against fruit moth and supplied 6,000 bags for the purpose.

In Nasik, 35 mango grafts, 1,835 santra and mosambi plants, 3 chiku grafts, 27 seedless guava plants, 175 pomegranate plants, 50 lemon grafts were supplied and 2,084 bor trees budded with Meherun bor buds.

From the funds of the District Village Improvement Committee, a nursery has been started at Nasik Central Prison Farm. Here 30 grape fruit plants and 40 Italian lemon plants have been planted. Twenty-five chiku layerings, 152 Italian lemon layerings and 12 mango grafts have been successfully made and they are now ready for distribution.

A stock of 48 mango grafts was purchased from the same funds for using them for grafting mango seedlings in the district in situ. Thirty-three plants were grafted in situ of which 19 are successful. The stock of grafts is still available for further work.

In Thana, the District Village Improvement Committee had sanctioned an amount of Rs. 1,750 in 1935–36 for the development of varkas lands by raising plantations of fruit trees on them. Two malis were entertained in the season. They prepared 131 gooty grafts of lemon, 254 approach grafts and 1,125 side-grafts on mango trees and 150 layering of chiku, 707 of lemon and 43 of guava.

In the nursery under development in Wada Taluka, 17 mango, 100 cashew-nut and 30 jack fruit seedlings were raised. One hundred and ninety lemon gooties were also prepared. In the nursery at the Thana Jail, subsidised from the same funds, 900 pine-apple suckers were planted.

Under the scheme of Varkas land development 240 mango grafts were sold at half price as an encouragement for mango planting. Besides, 39 lbs. of cashew-nut seed, 10 lbs. of jack fruit and 4½ lbs. of kokum seed were distributed. Similarly, 340 Meherun bor buds were budded on 150 wild bor trees.

In Kolaba District, 748 mango grafts, 421 lemon plants, 31 other citrus plants, 1,050 pine-apple suckers, 46 guava plants, 157 Italian lemon plants,

33 chiku grafts, 8.000 cashew-nut seeds, one pound kokum seed, 10 grape fruit plants, 166 mango stock plants and 225 Meherun bor buds were supplied. The Kamgar at Pen carried out top grafting of mango on 50 trees, side-grafting on 109 trees and prepared 126 approach grafts.

The seasonal Mali entertained from the grants of the District Village Improvement Committee helped in the actual distribution of plants and seeds mentioned above and their planting and operated 30 mango trees with top-grafting and 230 by side-grafting. He also prepared 125 approach grafts of mango, 30 chiku grafts and budded 100 wild bor trees with Meherun buds.

IMPROVED IMPLEMENTS.

Two more implement depôts were started by the Taluka Development Associations in Khandesh thus making the total of 48. The number of ploughs kept for hire in these depôts was 719 as against 671 of last year. A small number of Sayan harrows, iron and wooden *petaris*, hand chaff-cutters and sugarcane crushers were also stocked. The total amount of hire realised on all the implements was Rs. 5,553. These Associations also carry on sale of implements. During the year, 45 iron ploughs and spare parts and 4 Sayan harrows worth Rs. 2,307 were supplied. There are 23 private implement agencies having 474 iron ploughs for hire. Three pumping plants driven by electric power were erected at Jalgaon and five pumps driven by oil-engines were newly set up in the district. In the preceding year, the number of pumping plants erected was 40.

In Nasik, fifteen implements depôts continued to work. Of these 10 belong to the Taluka Development Associations and five to the Department. Besides, there are two Implement Societies working at Dabhadi in Malegaon and at Kalwan. The number of ploughs in Taluka Development Associations' depôts was 392. Besides, there were 31 sugarcane crushers and 60 Poona gul-pans. The amount of hire realised was Rs. 6,618. The implements sold through these depôts were worth Rs. 1,915. The Departmental depôts had 49 ploughs and the amount of hire realised was Rs. 339. The sales of implements effected through these depôts consisted of 41 iron ploughs, 56 spare parts and 25 bajri sieves, at a total value of Rs. 1,286. Two oil-engine pumping plants and 17 electrically driven pumping plants were erected during the year. Out of these, 11 electric pumps have been fitted up at Malegaon and 6 at Nasik. On an average the installation of an electric pump for a lift of 25 feet costs Rs. 500 and the consumption is $1\frac{1}{2}$ units per hour.

CONTROL OF PESTS AND DISEASES.

1. *Betelvine Wilt Disease.*—As referred to on page 81 of last year's report, the campaign against betelvine wilt disease was continued in Bassein and Mahim. Five demonstration plots of the treatment with Bordeaux mixture were laid out in May 1937 and five more were again arranged after the planting in October. Five demonstration plots for the second year's crop (*modwan*) were also arranged. For successful

control, mere treatment of the soil with Bordeaux mixture is not enough. Proper attention to drainage and soil improvement so as to create conditions unfavourable for the spread of the disease, are necessary. It has, therefore, been found essential to impress these factors on the cultivators together with the knowledge of how the disease spreads. This was done by frequent visits to plantations and giving advice on spot and also by holding tutorial classes. Eighteen such classes were held, 29 demonstrations given and caution notes were issued from time to time and widely distributed. Frequent visits to plantations and closer association with cultivators was made possible on account of monetary help from the Thana District Village Uplift Committee, which has given an amount of Rs. 1,800 spread over 3 years. The thirteen sets of tubs kept for hire were used by 100 cultivators. The Vicar of Mercis Church was induced to stock for sale at cheap rate, the chemicals and he sold 7 cwt. of copper sulphate and 20 tins of lime of good quality. Besides, the District Agricultural Overseer supplied 20 tins of lime. As a result of such intense propaganda, it is estimated that plantations on 200 out of the 500 acres were treated against the disease. Last year the area was 100 acres. About 30 tons of copper sulphate and almost and equal quantity of lime were used during the year.

2. *Powdery Mildew on Betelvine.*—This disease appeared from December to March. This is kept under control by sulphur dusting. Eight demonstrations were arranged and the two dust guns belonging to the Village Uplift Committee were given for free use. Fifty cultivators took advantage of these guns and saved their crops.

3. *Mango Hoppers and Mildew.*—During the year under report, blossoming of mango was poor and the attack of hoppers and mildew was severe as usual. Sulphur dusting as a treatment was demonstrated in Thana on 1,313 trees and the ten dust guns of the Village Uplift Committee were given out for free use. In Kolaba, the treatment was demonstrated on 859 trees and 1,348 lbs. of sulphur dust was sold.

There has been considerable amount of opposition to this treatment on the ground that it is ineffective. The Plant Pathologist to Government and the Professor of Entomology have, therefore, undertaken to investigate the causes of ineffectiveness of sulphur dusting in this tract.

4. *Gummosis on Citrus Trees.*—The treatment against gummosis is now fairly well known among orchard owners and 4,430 plants were treated with Creosote in East Khandesh and 70 lbs. of this insecticide was sold by Taluka Development Associations. In West Khandesh, 150 trees were treated under departmental guidance while in Nasik 330 trees were treated and 10 lbs. of Creosote sold.

5. *Stem Borer.*—Stem borer is another common trouble in citrus and mango orchards. In East Khandesh, the method of destroying stem borer with petrol was shown on 1,910 trees and 50 lbs. of petrol was supplied. In West Khandesh, it was done on 175 trees.

6. *Fruit Moth.*—In East Khandesh, 169,800 paper bags were supplied for bagging fruits of citrus trees against this insect. The number supplied in West Khandesh was 6,696. This trouble occurs in gardens where *ambe-bahar* is taken and, therefore, it is limited in extent.

7. *White Ants.*—This is another insect trouble in orchards and people are advised to dig out ant-hills and kill the queen-ant. This was demonstrated at 21 places in East Khandesh. In West Khandesh, 180 ant-hills were dug out and queen-ants killed.

8. *Loranthus on Mango.*—Advice to remove loranthus parasite (Loranthus Longiflorus) common in old mango gardens is being given by members of the district staff and 144 trees in Nasik and 620 trees in Thana were cleared of this parasite under departmental guidance. Further campaign is proposed to be started in the Bombay Suburban District.

9. *Rats.*—There was sporadic attack of rats on wheat crop in Khandesh and 17 lbs. of cyno gas was supplied for treatment of burrows in East Khandesh and 11 lbs. in West Khandesh. The operations were carried out with pumps supplied by Taluka Development Associations and the Department. In Nasik, 2,900 arsenic pills were supplied as a remedy.

10. *Aphides.*—This is a common pest on vegetable crops and is controlled by spraying with Fish Oil Rosin Soap. In East Khandesh, 40 lbs. of this insecticide and in Nasik 184 lbs. were supplied.

11. *Wingless Grass Hoppers.*—Wingless grass hoppers appeared Bajri crop in Niphad and Chandor Talukas on 400 to 500 acres. Control measures were demonstrated and prizes worth Rs. 20 were distributed for collecting and killing eggs and insects.

12. *Jowar Smut.*—Propaganda about the treatment of jowar seed with sulphur as a preventive remedy against smut was carried on and 4,700 two-ounce packets were distributed in East Khandesh, 5,566 in West Khandesh and 2,152 in Nasik.

13. *Potato Rust.*—Potato is grown to a limited extent in Kalwan and Nasik. This crop is affected by rust. Demonstrations of treatment with lime-sulphur dusting were given and 110 lbs. of sulphur was supplied.

14. *Wild Pig Campaign.*—As stated on page 82 of last year's report four gun clubs were organised for the destruction of wild pigs, two in Bhusaval and two in Edlabad in East Khandesh. One hundred and seven hunting campaigns were carried out and 306 wild pigs and 42 *rohis* were killed. The area protected was about 40,000 acres and it is estimated that 20 per cent. of the total damage was saved and an approximate saving of Rs. 55,000 caused. The cost of working came to Rs. 1,150, which were collected partly from local subscription of members of clubs and partly

from grants from the Village Uplift Committee and District Local Board. The demand for gun clubs is increasing.

The Raver Taluka Development Association had engaged three shikaris as in the past who killed 126 wild pigs at a cost of Rs. 257. The work is, however, done at random and needs organised campaign.

15. *Stray Cattle.*—The complete eradication of cactus has deprived many fields of a formidable and permanent live fence. Agave is being recommended as a fencing plant. 31,000 agave bulbs were supplied for planting in Bhusaval section.

SHOWS, DEMONSTRATIONS AND CLASSES.

1. *Agri-Horticultural Classes.*—Two classes were held at Malegaon in Nasik and Bandhan in Palghar Taluka of Thana. The class at Malegaon was held for four days from 23rd to 26th February and attended throughout by 60 cultivators from Malegaon and Nandgaon Talukas. The Taluka Development Association, Malegaon, had made arrangements for free lodging and boarding for all the students.

At Bandhan, classes in four subjects, namely, general agriculture, horticulture, oil-engines and poultry, were held each for five days simultaneously from 7th to 12th March 1938 and were attended by 60 agriculturists in all. These classes were chiefly held as an adjunct to the Taluka Agricultural and Industrial Show held there and proved very useful.

2. *Shows.*—A Taluka Agricultural and Industrial show was held at Bandhan in Palghar Taluka from 6th to 12th March 1938. The show was arranged in an educative manner and demonstrators were located on all the stalls to explain the exhibits to the visitors, who arrived on different days. In addition to the usual stalls, crops of bringals, tomato, Dharwar chillies, cabbage, cauliflower, onion, tobacco, etc., were grown for demonstration under irrigation. The crops were in their bloom at the time of the Show and were very vigorous. The Show was opened at the hands of the Honourable Mr. M. R. Desai, Minister for Revenue, Agriculture and Rural Development. The total number of cultivators who visited the show was 10,000 in six days.

3. *Rural Uplift Van.*—The Village Uplift Van under the Commissioner, Central Division Poona, toured in Nasik, West and East Khandesh from 3rd January to 31st March 1938. It halted at 26 centres in Nasik, 13 in West Khandesh and 17 in East Khandesh. At all places of halt, the district staff gave demonstrations and lectures with and without the help of magic lantern. The necessary exhibits, models, appliances, leaflets, etc., were carried by the staff with the van.

The Village Uplift Van under the Commissioner Southern Division, toured the district of Kolaba in April-May and halted at 15 places. The district agricultural staff attended this Van at all the halts and gave demonstrations and lectures.

4. *Field Demonstrations and Lectures.*—This forms the most important means of agricultural propaganda and the district staff gives a very large number of demonstrations of various improvements in cultivators' fields with the help of the Taluka Development Associations. These have been classified according to subjects and detailed in the following table :—

Table showing the Details of Demonstrations.

Kind of demonstration.	East Khandesh		West Khandesh.		Nasik.		Thana.		Kolaba.	
	No.	Attendance.	No.	Attendance.	No.	Attendance.	No.	Attendance.	No.	Attendance.
1	2	3	4	5	6	7	8	9	10	11
Crops ..	157	3,100	61	1,210	59	1,896	50	1,445	15	800
Manures ..	131	2,750	56	1,400	41	690	7	1,200	4	120
Implements ..	193	3,495	94	1,880	32	948	..	..	..	..
Control of Pests and Diseases.	317	5,065	106	2,320	73	1,210	30	720	12	500
Magic lantern ..	28	9,400	27	5,500	34	4,650	15	1,425	15	7,500
General demonstrations.	62	7,300	102	5,010	94	5,150	60	5,523	..	..
Cattle shows ..	..	..	3	3,000	..	..	..	..	1	1,605
Agricultural shows	..	..	..	..	..	..	1	10,000	..	..
Fair demonstrations	9	1,800	8	7,200	1	1,000	3	1,000	..	..
Gul making ..	..	..	14	280	3	60	..	..	..	..
Van demonstrations	17	3,600	13	1,500	26	9,500	..	..	15	7,500
Anti-erosion ..	1	100	..	..	16	500	..	..	..	..
Canning of fruit ..	..	..	..	..	..	..	4	175	..	..
Total ..	916	36,610	484	29,300	379	25,604	170	21,588	62	17,920

There were thus 2,011 demonstrations including lectures and these were attended by 131,014 people.

INFORMATION SERVICE.

The members of the district staff continued to contribute articles of practical utility to the Marathi magazine *Shetki* and *Shetkari* and Marathi papers. *Dyan Prakash* of Poona, *Nawakal* of Bombay, *Vijay* of Jalgaon, *Bharat* and *Jagriti* of Dhulia, *Gavkari* of Malegaon and

Shetkari of Nasik. The total number contributed was 50 ; for wider publicity the same article appeared sometimes in more than one paper.

The Taluka Development Associations continued to subscribe for a large number of copies of *Shetki* and *Shetkari* magazine for free distribution. The village leaders and school teachers read the magazine to villagers. Members of the district staff do likewise during their halts in villages. Twenty-one new subscribers were secured to this magazine.

The Departmental staff supplied 6 copies of the Marathi book on agriculture by name "आमची शेती", 12 copies of "कलमी आंब्याची व्यापारी लागवड", 40 copies of "फळझाडांचा बाग", 2 of कोंबड्याची जोपासना 2 of "द्राक्षांची लागवड" 3 of "भाजीपाल्याचा मळा", and 166 bound volumes of departmental leaflets.

Rural Broadcasting.—The Government have installed Rural Broadcasting sets in 18 villages in Thana and Kolaba and the operations were begun during the year under report. Twenty-six notes on agricultural subjects applicable to local conditions were sent for broad-casting from time to time to the Director of All-India Radios, Bombay. The notes were well heard.

TALUKA DEVELOPMENT ASSOCIATIONS.

The number of Taluka Development Associations in the division is constant at 30. Some of these have deteriorated due to decline in membership. Their Fieldmen also have become lazy and the Managing Committees ignore their actions. The result is that the reserve fund is being tapped for routine expenditure. The rates of pay of the staff are also high and only a small proportion of the expenditure is incurred on the legitimate duty of demonstration plots and technical help and material. Wherever the Filedmen of these bodies are conscientious workers, the Associations have done excellent work and are also financially sound. Among these may be mentioned Malegaon, Satana, Ozar, Jalgaon, Jamner, Raver, Dhulia, Taloda and Dahanu. The Malegaon and Satana Associations realised as much as Rs. 2,600 and Rs. 2,175 by way of hire on implements. The Ozar and Jalgaon Associations got Rs. 998 and Rs. 520 respectively from this activity. They also sold manures and fertilizers worth Rs. 18,820 and Rs. 8,600 respectively. The Jalgaon and Jamner Associations run cattle breeding farms. The Dhulia Association carries on work from four centres in the taluka. The Taloda Association does very useful work among the Bhils and the Dahanu Association opened 44 seed and 27 grain depôts in jungle-patti. The Raver Association conducts shikar work against wild pigs. All these Associations have more than two centres of work in their talukas and they carry on demonstration and propaganda on all the improvements and arrange for the supply of improved agricultural material on large scale.

DHULIA AGRICULTURAL SCHOOL.

The Agricultural School at Dhulia has now completed its 15th year. Eighty-four applications were received for admission to the school from East and West Khandesh and Nasik districts. Out of these 18 were selected. There is a day-student in addition. The total strength of boys including 14 of last year, is 33. The results of the annual examination were satisfactory and 16 boys left the school after completing the second year's course.

Equipment for practical teaching has been maintained at high standard. There are fruit, vegetable, and flower gardens, poultry runs, work shop for carpentry, smithy and weaving, an oil-engine and pump for irrigation, and large area for the growing of jirayat crops. The boys prepare compost manure from farm refuse in kharif and rabi season and the quantity thus made was 60 cart loads. They also use trench latrines and apply the resulting poudrette to their fields as manure. Green manuring of fields with sann crop is regularly practised on the school farm.

The boys receive a stipend of Rs. 6 per month from the Local Advisory Committee, and manage their boarding on club system under the guidance of the Head Master. The average expenditure per boy came to Rs. 5–10–0. Medical help is given free and the local Assistant Surgeon, Dhulia, visits the school once a week. There is an agricultural museum, a library and ground for games provided on the premises.

The Local Advisory Committee received Rs. 2,022 as contributions from the Sir Sassoon David Trust Fund, Local Board, Municipalities, and the Taluka Development Associations. They spent Rs. 1,850 on stipends to students and have a balance of Rs. 4,597 on hand. Even in the newly constituted Advisory Committee, Mr. B. R. Ransing, B.A., LL.B., continues to be its Chairman. The Committee deserves thanks for the continued interest, it has been taking in the promotion of Primary Agricultural education.

The produce from school farm is given out as pure seed. During the year under report, cotton, groundnut and bajri seeds worth Rs. 431 were thus issued.

REGULATED COTTON MARKETS.

1. *Dhulia Cotton Market.*—During the year under report, this market completed its eighth season of working. It continues to work efficiently and enjoys the confidence of both the cultivators and the buyers.

The total number of carts arrived this year was 43,096 of seed cotton, 2,040 of lint and 109 of waste cotton as against 34,978, 2,190 and 282 carts respectively of the last year. The mal-practice of bringing waste cotton to Dhulia for mixing with good cotton continues but on lower scale. The number of disputes settled this year was the same, i.e. 267 out of which only 13 appealed to the Dispute Sub-Committee.

The financial position of the market is sound. During the season the receipts amounted to Rs. 9,778 as against an expenditure of Rs. 5,987. The Market Committee has at present Rs. 22,400 in cash balance in addition to the immoveable property worth Rs. 5,000. The work of acquiring a site for the Market is still in progress.

2. *Amalner Cotton Market.*—This is the second Cotton Market in Khandesh. It has completed its fourth year of working during the year under report. The total number of carts arrived this year was 17,140 of seed cotton, and 466 of lint and waste cotton. The net receipts of the market during the year under report amounted to Rs. 3,562 as against an expenditure of Rs. 3,313.

The work of starting two more markets—one at Jalgaon and the other at Dondaicha—has been completed and they would begin to function regularly from the ensuing cotton selling season.

IMPROVEMENT OF LIVE STOCK.

His Excellency the Viceroy's Scheme of Cattle Improvement.

The appeal for contributions for breeding bulls under this scheme received good response and 106 bulls have been so far located. Out of these 48 were located in 1936–37 as referred to on page 89 of last year's report. The following table shows the contributions received by districts and the number of bulls located, so far :—

Name of district.	Total contributions promised		Amount received.	Bulls received in kind.	Amount spent	
	in cash.	in kind.			on purchase of bulls.	on maintenance.
1	2	3	4	5	6	7
	Rs.	No.	Rs.	No.	Rs.	Rs.
1 East Khandesh ..	22,157	3	15,198	1	8,329	274
2 West Khandesh ..	10,672	14	9,485	..	6,497	..
3 Nasik	4,923	12	1,989	1	..	98
4 Thana	5,692	11	5,197	4	1,450	260
5 Bombay Suburban ..	6,411	1	6,411	1	1,690	67
6 Kolaba	2,978	..	2,978	..	1,448	98
Total ..	52,832	41	41,258	7	19,414	797

The location of bulls by breeds is shown below :—

District.	Number of bulls of breeds.					Total.
	Khilar.	Dangi.	Nemar.	Gir.	Pandharpuri buffalo bull.	
1	2	3	4	5	6	7
1 East Khandesh	15	..	16	8	..	39
2 West Khandesh ..	36	..	..	3	..	39
3 Nasik	..	..	..	1	..	1
4 Thana	..	8	..	5	..	13
5 Bombay Suburban ..	..	3	..	2	..	5
6 Kolaba	..	3	..	..	6	9
Total ..	51	14	16	19	6	106

Silage making from Green Grass.—The Thana District Village Improvement Committee has allotted a sum of Rs. 1,600 spread over five years for demonstrating silage making from green grass which abounds in that district. 16 silo pits were filled in from these funds at a cost of Rs. 147. The pits were dug on high lying grass lands. The pits were circular with 8 feet diameter at the top and 7½ feet at the bottom with a depth of 6 feet. They were filled with 3,000 lbs. of green grass each from 5th to 15th of October and opened during the following March and April. Demonstrations were held on both the occasions. The degree of success in silage making depends upon the smoothness of the sides and the degree of pressing given while filling so as to exclude all air.

In Dahanu, Palghar and Badlapur, 8 more pits were filled with green grass for silage and demonstrations held.

This activity will be continued until people take to silage making.

IMPROVEMENT OF POULTRY.

Poultry.—There are 9 poultry farms run by institutions in this division for the supply of setting eggs and cocks of improved breeds. List of

such farms, breeds reared there and total strength of birds at each of them at the end of the year is given below :—

Name of poultry farm.	White Leghorn.	Rhode Island Red.	Remarks.
	Total number of birds.	Total number of birds.	
Varangaon	85	24	
Pachdevli	75	16	
Fulgaon	113	..	
Gilligan Cattle Farm, Pimple ..	172	..	
Dhulia Agricultural School	386	..	
Satana T. D. Association	50	..	
Nasik School of Agriculture ..	52	..	
Bordi Poultry farm*	..	..	
Karjat Poultry farm	22	12	

*The stock of ten birds of white Leghorn died of Doyle's disease.

Following table shows number of birds and eggs of improved breeds distributed to cultivators in this Division :—

Name of the District.	Number of birds supplied.	Number of eggs supplied.	Remarks.
East Khandesh	29	1,324	These include the supplies made from the poultry farms mentioned in the foregoing table and also those obtained from the Central Poultry farm at Kirkee, Poona.
West Khandesh	246	477	
Nasik	110	270	
Thana	60	96	
Kolaba	41	140	

With a view to educate the cultivators in the day to day management of poultry keeping, it is proposed to start concentrated work in Wada taluka of Thana district and Karjat of Kolaba district by locating a special Poultry Kamgar at each centre. He would run a small poultry model farm for demonstration and also pay frequent visits to surrounding villagers and advise them in all details. The funds for this have been provided by the District Village Uplift Committees.

RURAL UPLIFT.

From the foregoing account of the district work it is clear that the grants received for the extension of agricultural improvements from Village Uplift Funds in different districts have been of material help. The various schemes financed from these grants, the amounts allotted and the expenditure incurred have been reproduced in the Appendix Nos. II and III. The progress of work made under each of the schemes

has already appeared in the preceding pages. The scattered information is put together by districts below :

East Khandesh.—40,510 lbs. of seed of the improved wheat strain No. 224 and 1,522 lbs. of Pusa wheat No. 4 were distributed on the system of return with 12½ per cent. interest. 9,729 lbs. of sann seed for green manuring wheat fields were also given out on similar system. 237 acres of land was got terraced in Jalgaon and Jamner talukas to prevent soil erosion. Practical assistance was given on seven farms to prepare compost manure from farm waste. Much assistance was rendered in horticultural matters. 1,534 Meherun bor bunds, 336 mango grafts, 30 chiku grafts were prepared for the cultivators by the Mali entertained from these funds. He also budded 505 jambori plants, treated 200 trees against stem borer, and demonstrated the pruning on 2,000 trees. The campaign against wild pigs was continued and 306 wild pigs and 42 rohis were killed in 107 hunts. This proved effective in giving partial protection to 40,000 acres of cropped land in Bhusaval and Edlabad. It is estimated that crops worth about Rs. 55,000 were thus saved. The cost of working the gun-clubs amounts to Rs. 1,150. The Rural Uplift Van visited 17 places and the district staff gave demonstrations and lectures at all the halts.

West Khandesh.—124,555 lbs. of wheat seed of the improved strain No. 168 and 7,890 lbs. of Pusa No. 4 wheat were distributed to 188 and 29 cultivators for further multiplication. The distribution work was subsidised at a cost of Rs. 275 at the rate of Rs. 1-8-0 per *map* of seed (720 lbs.), 20,800 lbs. of sann seed was distributed at the concession rate of 75 per cent. of cost price and the loss debited to grants from Village Uplift funds. An area of 1,300 acres was bunded in Sindkheda and Dhulia. The Dhulia Agricultural School Poultry Farm subsidised from these funds issued 246 fowls of various ages and 364 setting eggs of White Leghorn breed. The Rural Uplift Van visited 13 places where the district staff gave demonstrations and lectures.

Nasik.—The Development of the School of Agriculture and Rural Vocations at Nasik has been going ahead apace. A new well is being dug and water has been struck. Eight scholarships have been promised for intending boys but the actual tuition work could not be started for want of a permanent teacher. The dairy section has six Gir cows and poultry section has 52 fowls. There are 190 trees in the orchard area.

13,780 whole sugarcanes of improved varieties are under distribution. An area of 2,966 acres was protected against soil erosion by bunding. 30 grape fruit plants and 40 Italian lemon plants were added to the nursery at the Central Prison. The nursery got prepared 25 chiku layerings, 152 Italian lemon layerings and 12 mango grafts. 33 mango plants were grafted in situ of which 19 have succeeded. The Rural Uplift Van visited 26 villages where the district staff gave demonstrations and lectures.

Thana.—There are now 13 sets of tubs for preparing Bordeaux mixture for treating betelvine plantations against wilt disease at Bassein. 100 cultivators used them. 18 tutorial classes and 29 demonstrations

explaining the nature of fungus, measures for its control etc. were held, besides personal visits to plantations for guidance. About 200 acres of betelvine plantation were under control measures. 50 cultivators used two dust guns for Sulphur dusting against Powdery mildew with success. 1,313 mango trees were dusted with Sulphur against mango hoppers and 10 dust guns were issued free for use to cultivators. The two seasonal Malis prepared 131 gooty grafts of lemon, 254 approach grafts and 1,125 side grafts on Mango trees, 150 chiku grafts, 707 lemon and 43 guava layerings. 240 mango grafts were sold at half price ; besides, 39 lbs. of cashew-nut, 10 lbs. of jack fruit and 4½ lbs. of Kokum seeds were distributed. The Nursery at Varli has 17 mango, 100 cashew-nut and 30 jack fruit seedlings and 190 lemon gooties ready for giving out. At the Thana District Prison Nursery 900 pine apple suckers of Kew and Queen varieties were added.

The first pumping plant for demonstrating the use of the tail water irrigation farming was erected at Yeranzade village on the bank of the Ulhas near Badlapur. An area of 8½ acres divided among 12 cultivators was grown to tomato, chillies, brinjals, onions, etc. Mali was entertained to guide the work on spot. The best farmer of the lot realised Rs. 185 from his plot of 28 gunthas after deducting marketing charges. There is demand for more pumping plants.

60 birds and 96 eggs of Rhode Island Red breed were distributed from the Poultry Farm attached to the S. P. Hakimjee High School, Bordi. The stock of 10 White Leghorn birds succumbed to Doyle's disease and 2 were rendered unfit for breeding. This has been a handicap in the progress of work there. Poultry work on educative lines is planned for Vada and the work of raising a Poultry Farm on the Private estate of Mr. Mulay of Mokhada is in progress.

Kolaba.—The pumping plant at Kasap irrigated an area of 14 acres and 10 gunthas, its full capacity, with vegetable crops of Brinjal, chillies tomato, onion, corriander and cucurbits, while 2 cultivators worked the Balsad rahat at Vayal with an area of 2 acres and 10 gunthas under similar vegetable farming. Two Balsad rahats out of 4 purchased, were fitted up at owner's cost on the farms of Messrs. Gujar and More in the Kundalika Valley have under vegetable and sugarcane crops 1 and 6 acres. Mr. Raje of Neral is looking after his farm and grew vegetables on 22 gunthas. The Mali top-grafted 30 mango trees, prepared 230 side-grafts and 125 approach grafts of mango, 30 chiku grafts and budded 100 wild bor trees with Meherun buds. He also helped in distribution of seeds, plants, etc. The Poultry Farm at Karjat with 22 and 12 birds of White Leghorn and Rhode Island Red breeds respectively, distributed 41 birds and 140 eggs in all.

The Rural Uplift Van toured this year in May-June in this district and visited 15 places where the district staff gave demonstrations and lectures.

K. V. JOSHI,

NASIK : 2nd August 1938. Deputy Director of Agriculture,
North Central Division, Nasik.

APPENDIX No. 2.

Statement showing details of grants for rural uplift in North Central Division.

I. Allotment. (Information up to 30th June 1938).

Serial Number.	Detailed Scheme.	Amounts allotted by the Village Improvement Committees in the districts.									
		East Khandesh.		West Khandesh.		Nasik.		Thana.		Kolaba.	
		Allotment.	Expenditure.	Allotment.	Expenditure.	Allotment.	Expenditure.	Allotment.	Expenditure.	Allotment.	Expenditure.
1	2	3	4	5	6	7	8	9	10	11	12
	Improvement of Agriculture.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1	Spread of Improved varieties of crops	2,000	2,000	1,255	618	..	..	..	..	400	400
2	Popularising Green manuring of wheat fields ..	500	500	500	496	..	..	..	..	..	..
3	Establishment of Quality Mango Nurseries ..	600	2,587	650	639	500	289	..	..	500	489
4	Improvement and Extension of Fruit Orchards and bor budding ..	1,988		..	..	..	..	1,750	1,002	1,500	682
5	Popularising Compost making and bone-crushing by charring	503	503	..	..	..	..	..	..	..	..

6	Prevention of soil erosion ..	596	594	600	446	300	300	..	..	..	..
7	Organisation of Gun-Clubs for Crop protection from wild pigs and Rohis ..	500	500	..	..	..	..	..	..	..	..
8	Spread of Improved variety of Sugarcane ..	..	..	500	500	500	500	..	..	..	..
9	Control of betelvine disease	..	..	..	..	..	..	750	750	..	..
10	Control of Mango-hoppers	..	..	..	..	..	..	750	747	..	..
11	Development of Patalganga Valley	..	..	..	..	..	..	..	..	2,802	2,488
12	Development of Kundalika Valley	..	..	..	..	..	..	..	..	2,150	250
13	Supply of Sulphur packets for Jowar Smut ..	..	..	503	503	..	..	..	..	..	..
14	Subsidy to Kadwa Canal Irrigators' Association, Ozar, for a Power Cane Crusher	..	..	..	..	1,000	1,000	..	..	..	..
15	Propaganda	..	..	..	..	..	..	..	..	898	846
16	Grant-in-aid to Hand-pumps	396	396	..	..	..	..	..	..	..	..
17	Grant-in-aid to Nursery in the District ..	250	..	..	..	..	..	..	..	..	..

M.O.1 Bk Q 10—7

APPENDIX No. 2—*contd.*

Serial Number.	Detailed Scheme.	Amounts allotted by the Village Improvement Committees in the districts.									
		East Khandesh.		West Khandesh.		Nasik.		Thana.		Kolaba.	
		Allotment.	Expenditure.	Allotment.	Expenditure.	Allotment.	Expenditure.	Allotment.	Expenditure.	Allotment.	Expenditure.
1	2	3	4	5	6	7	8	9	10	11	12
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
	Nasik School of Agriculture and Rural Vocations.										
1	Model Farming ..	..	..	..	..	2,000	2,000	..	..	..	..
2	Horticulture	..	..	..	..	1,500	1,262	..	..	..	..
3	Poultry	..	..	..	..	1,500	1,500	..	..	..	..
4	Dairying	..	..	..	..	1,500	1,360	..	..	..	..
5	Secondary Occupations ..	..	..	..	..	500	..	..	..	..	..
	Livestock Improvement.										
1	Supply of bulls and cows to cattle Farms ..	2,000	1,925	1,100	..	..	..	..	..	..	..
2	Subsidy to Cattle Farms for feeds	1,000	1,000	..	..	..	..	..	..	..	..
3	Supply of Stud Bulls ..	500	500	1,200	..	..	..	628	628	..	..

4	Maintenance and incidental charges on bulls ..	500	480	700	..	..	..	..	..	..	..
5	Subsidy to Cattle Breeding Farm in the district ..	..	..	..	..	3,000	..	..	..	..	..
6	Subsidy to Poultry Farms	1,000	750	800	800	..	..	1,500	1,500	2,000	750
7	Subsidy to Goat Breeding Farm	1,000	1,000	..	..	..	..	..	..	..	..
	Total ..	13,333	12,735	7,808	4,002	9,300	8,211	5,378	4,627	10,250	5,905

M.-I. Bk. O. 10—7a.

Abstract.

District.	Allotments.	Expenditure.	Remarks.
	Rs.	Rs.	
East Khandesh	13,333	12,735	
West Khandesh	7,808	4,002	
Nasik	9,300	8,211	
Thana	5,378	4,627	
Kolaba	10,250	5,905*	*The balance under grants of Kolaba are pooled together and withdrawn in favour of a five-year programme.
Total ..	46,069	35,480	

K. V. JOSHI,
Deputy Director of Agriculture,
North-Central Division, Nasik.

APPENDIX No. 3.

Statement showing details of grants for rural uplift in North Central Division.

II *Allotment.* (Information up to 30th June 1938.)

Serial No.	Detailed Scheme.	Amounts allotted by the Village Improvement Committees in the districts.									
		East Khandesh.		West Khandesh.		Nasik.		Thana.		Kolaba.	
		Allotment.	Expenditure.	Allotment.	Expenditure.	Allotment.	Expenditure.	Allotment.	Expenditure.	Allotment.	Expenditure.
1	2	3	4	5	6	7	8	9	10	11	12
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
	Improvement of Agriculture.										
1	Conservation of soil ..	5,000	126	3,700	510	4,000	800	..	..	..	..
2	Organisation of Gun-clubs for Crop protection from wild pigs and Rohis ..	4,000	250	..	..	..	..	..	..	..	..
3	Popularisation of the use of Sann seed.. ..	..	..	2,000	89	..	..	..	..	..	..
4	Spread of Improved varieties of crops ..	..	..	3,000	600	..	..	1,000	..	..	..
5	Horticulture, Bone Manure and Compost making ..	286	..	3,500	214	..	..	1,250	..	513	476

6	Subsidy to Nasik School of Agriculture, and Rural Vocations	..	..	..	..	5,000	400	..	..	..	..
7	Development of Ulhas Valley	..	..	..	..	..	..	10,000	3,021	..	..
8	Development of Patal-ganga and Kundalika Valleys	..	..	..	..	..	..	..	..	4,210	1,161
9	Establishment of Nurseries	..	..	..	..	..	..	..	..	500	..
10	Tree-planting ..	..	..	2,500	..	..	..	..	..	..	..
11	Control of Betelvine disease	..	..	..	..	..	..	1,800	303	..	..
12	Silage making ..	..	..	..	..	..	..	1,600	147	..	..
	Improvement of Livestock.										
13	Subsidy to Cattle Breeding Farm, Niphad ..	..	..	..	..	5,000	..	..	..	..	..
14	Poultry Farming ..	..	..	500	100	..	..	1,340	250	2,100	27
	Secondary Occupations.										
15	Uses of Gilka ..	..	..	..	..	..	..	50	..	..	..
	Total ..	9,286	376	15,200	1,513	14,000	1,200	17,040	3,721	7,323	1,564

N.B.—The Khandesh Schemes are spread over five years and while those in other districts are spread over three years.

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Abstract.

District.	Allotment.	Expenditure.	Remarks.
	Rs.	Rs.	
East Khandesh	9,286	376	
West Khandesh	15,200	1,513	
Nasik	14,000	1,200	
Thana	17,040	3,721	
Kolaba	7,323	1,564	
Total ..	62,849	8,374	

K. V. JOSHI,
Deputy Director of Agriculture,
North-Central Division, Nasik.

APPENDIX No. 1.

Statement showing the information of the Taluka Development Associations in the North Central Division, for the year 1937-38.

Serial No.	Name of the Taluka Development Association.	Total Actual receipts.	Total Actual Expenditure.	Government Subsidy.	Main activities.							
					Number of plots arranged	Number of Demonstrations held.	Quantity of seed sold and distributed.	Number of plants and seedlings sold and distributed.	Quantity of manure or fertilizers sold.	Number of implements sold.	Number of implements kept for hire.	Total hire charged on implements.
1	2	3	4	5	6	7	8	9	10	11	12	13
	Nasik District.	Rs.	Rs.	Rs.			Lbs.		Lbs.			Rs.
1	Nasik	83	116	342	4	..	..	..	..	..	4	1
2	Ozar Tambat	2,235	2,149	382	56	20	2,778	..	314,144	1	27	998
3	Yeola	1,355	1,460	560	8	5	2,201	74	..	..	106	450
4	Malegaon	4,604	3,291	450	80	89	68,190	1,226	33,563	85	284	2,613
5	Satana	3,691	3,713	..	39	32	9,506	..	49,828	10	131	2,175
	West Khandesh.											
6	Dhulia	2,151	2,641	450	3	48	5,144	1,515	36,113	11	52	409
7	Sakri	6,395	7,886	560	38	87	12,226	281	25,056	1	30	149

APPENDIX No. 1—*contd.*

Serial No.	Name of the Taluka Development Association.	Total Actual receipts.	Total Actual Expenditure.	Government Subsidy.	Main activities.							
					Number of plots arranged	Number of Demonstrations held.	Quantity of seed sold and distributed.	Number of plants and seedlings sold and distributed.	Quantity of manure or fertilizers sold.	Number of implements sold.	Number of implements kept for hire.	Total hire charged on implements.
1	2	3	4	5	6	7	8	9	10	11	12	13
		Rs.	Rs.	Rs.			Lbs.		Lbs.			Rs.
	West Khandesh—contd.											
8	Sindkheda	2,848	2,090	450	46	111	49,316	76	100,634	2	22	184
9	Shahada	1,468	1,487	450	25	51	57,214	15,125	67,170	4	10	25
10	Taloda	646	1,292	450	64	103	32,400	200	1,870	..	5	5
11	Nandurbar	513	1,742	450	26	66	35,195	732	13,888	6	18	102
12	Shirpur	631	1,382	560	12	64	7,454	275	34,825	1	47	133
13	Nawapur	1,168	2,353	331	..	1	26,266	..	224	..	..	..
	East Khandesh.											
14	Jalgaon	4,364	4,346	450	35	15	101,275	4,130	242,560	26	50	520
15	Bhusawal	2,376	3,006	191	62	158	43,890	14,758	144,344	12	43	491
16	Raver	1,739	2,470	272	23	167	18,626	2,266	51,879	2	38	428

17	Yawal	1,669	2,390	560	76	75	5,020	3,399	41,185	8	50	595
18	Edlabad	926	1,361	450	20	50	5,862	1,912	2,385	11	28	109
19	Amalner	1,849	1,815	560	40	62	10,952	819	8,785	18	30	125
20	Chalisgaon	1,591	2,466	..	47	107	4,690	1,206	26,160	122	38	288
21	Chopda	2,360	1,835	475	27	7	19,776	600	20,650	89	38	338
22	Erandol	1,288	2,391	263	14	128	18,025	3,084	26,175	7	35	240
23	Pachora	2,066	2,968	450	24	47	24,732	6,761	10,690	1	47	248
24	Parola	2,089	2,278	100	35	66	18,841	1,500	28,285	64	63	474
25	Jamner	9,829	9,548	560	22	27	3,300	3,354	32,602	15	80	810
	Thana District.											
26	Dahanu	908	1,403	346	76	76	14,168	17,703	..	..	..	..
27	Palghar	859	1,367	450	14	8	9,460	150	..	..	..	..
28	Umbergaon	374	475	100	40	12	5,891	570	24,269	..	..	..
	Kolaba.											
29	Roha	180	188	120	..	..	350	4,000	896	..	..	..
30	Mahad	378	490	217	..	9	6,668	561	..	..	..	..

Nasik, 1st August 1938.

K. V. JOSHI,
Deputy Director of Agriculture,
Northern-Central Division, Nasik.

APPENDIX D.

Summary of Work done under the Deputy Director of Agriculture, South Central Division, for the year 1937-38.

Staff.

I held charge of the office of the Deputy Director of Agriculture, South Central Division, Poona, throughout the year except for a period of three months and six days, when Mr. B. S. Patel, I.A.S., was appointed as Deputy Director of Agriculture, South Central Division, Poona.

The Deputy Director continued to be the nominee of the Government, to represent agriculture on the Local Advisory Committee of the G. I. P. Railway. He was also a member of the Irrigation Conference.

Mr. G. P. Patil continued to hold the charge of the Divisional Superintendent of Agriculture, Deccan Canals, Baramati, throughout the year. Mr. S. B. Jadhav, who was on leave for four months with effect from 19th May 1937, was transferred to Kopergaon Farm, to work as Superintendent, Kopergaon Farm, with effect from 19th September 1937, and Mr. C. A. Borudey, the Superintendent, Kopergaon Farm, was transferred to Baramati, to work as District Agricultural Overseer, Baramati, *vice* Mr. B. H. Ghatikar, who was transferred to the Southern Division.

Mr. G. L. Patil has been on deputation to Kolhapur State, and Mr. N. S. Joshi has been on leave on average pay and half average pay on medical certificate.

During the year under report, I very much regret to record the sad death of Mr. B. N. Bhandarkar, the District Agricultural Overseer, Malsiras, who had done very good work on the Nira Right Bank Canal. He was very popular with the officers of the Irrigation Department and the Public and with their help he tried to set aside the grievances of the irrigators.

Lines of work.

The work of this division is summarised under the following headings :—

(1) Season.

(2) Research.

(3) Propaganda.

(4) Agricultural Organization :—

  (*a*) Taluka Development Associations.

  (*b*) Non-credit Societies.

(5) Agricultural Services.

(6) Miscellaneous.

Section I.

Season.

In the Deccan, there was excessive heat during the month of May 1937, which was most injurious to sugarcane and irrigated cotton crop. There were no pre-monsoon showers this year and consequently the preliminary operations could not be done properly. Monsoon started about the second week of June, but the fall of rain was quite insufficient in Poona, Ahmednagar and Sholapur Districts. As there was scarcity of rain in the previous year, cultivators were in haste to sow kharif crops, which never came up to the standard. There was a long break in the month of August 1937, which was most harmful to the young crops. In many places of Sholapur and Ahmednagar, the kharif crops had to be grubbed up and the lands were prepared for rabi season. The months of September and October, were of sufficient rain and the sowing of rabi crops was started. There was practically no rain in the month of November and also in December and the rabi crops suffered for want of moisture in the final stage.

In the Mawal tract, however, there was excess of rain and some rice fields were actually damaged. In Satara district there was fairly good rain, both in kharif and rabi season and all the crops were in good condition, except in some parts of eastern talukas.

In Ratnagiri district, heavy rainfall was recorded till the end of July, which was rather harmful to the young seedlings and transplanted rice. In southern parts of this district, there was comparatively less fall of rain which affected the yield of rice.

On the whole, the kharif season was most unsatisfactory in the Deccan, except the Satara district and Mawal tract; while the rabi season was more satisfactory.

Section II.

Research.

Work on the Kopergaon Farm.

Season.—The total rainfall during the year was 23 inches and 25 cents in 51 rainy days as against the average rainfall of 19 inches and 76 cents for this tract. The rainfall was more than normal, but it was not well distributed. The rainy season started from the 13th June, but the total rainfall in June was only 2 inches and 21 cents. Sowing of kharif crops could not, therefore, be commenced till 1st of July. The continuous drizzling rain in July, helped the growth of weeds. Long break in August and 1st fortnight of September helped to clean the fields. Heavy rains in 2nd fortnight of September spoiled the crop of bajri to a certain extent. Rabi season was on the whole favourable to crops like jowar, wheat, gram, etc. There was no rainfall from November onwards.

The maximum temperature had gone up to 112°F. in the month of May 1937 and the minimum had gone down to 38°F. in December. The minimum temperature had not gone down below 50°F. in the month of January 1938.

The sugarcane crop was on the whole fairly good, but the growth was hampered to a certain extent due to long break of rain in August and 1st fortnight of September. The prices of gul had gone high all of a sudden up to Rs. 18 to 20 per Palla at the end of April 1938 and only a few sugarcane growers were benefited, as the produce was mostly sold by this time.

The cotton crop was damaged by green catterpillar in the infant stage in May and continuous rains in July helped the growth of weeds. The crop also suffered heavily due to long break in August. Pink Boll worm and heavy rains in October affected the crop and as a result, the yield was very poor this year. The prices of cotton were abnormally low throughout the whole season.

The following experiments were conducted on this farm :—

I. Trial of cane varieties.
II. Nitrogenous requirements of cane.
III. Adsali cane cultivation.
IV. Trial of cane varieties recommended by the Padegaon Research Station.
V. Trial of sugarcane Sorghum hybrids.
VI. Miscellaneous experiments on other crops :—
  (*a*) Trial of K-1, K-3 and Spanish peanut varieties of groundnut.
  (*b*) Trial of Phaseolus Trilobus as a green manure crop for jowar and wheat.
VII. Banilla Cotton Scheme.
VIII. Compost making.

1. Trial of cane varieties.—The following cane varieties were tried in 10 guntha plots and the results per acre are tabulated below :—

Plant cane.

Yield per acre.

Name of variety.	Weight of cane.	Weight of gul.	Extraction.	Brix.	Average of last 6 years.	
					Cane weight.	Gul weight.
	Lbs.	Lbs.	Per cent.		Lbs.	Lbs.
Co. 290 ..	80,216	9,964	65	20·93	80,901	10,206
Striped D. 109 ..	78,716	9,228	69·5	18·84	80,529	9,724
E. K. 28 ..	56,512	6,256	68	21·80	67,006	9,445
P. O. J. 2878 ..	72,972	9,294	63·5	22·65	65,267	8,849
Pundya ..	72,672	9,612	71	19·47	72,255	9,178
Co. 419 ..	119,224	13,880	66	18·90	..	..

During the year under report, Co. 419 variety was included in the varietal series for trial and it has given the highest yield while E. K. 28 has given the lowest. Co. 290 stands above all other varieties in point of yield excepting Co. 419. Average yields of the above five varieties for the last six years are given. Co. 419 was introduced only last year. It will be seen from the average figures of yield that Co. 290 stands first while P.O.J. 2878 stands last in point of yield as plant cane. E.K. 28 and striped D. 109 are next to Co. 290 though the difference in yield of the first three varieties is not very material. Co. 419 variety seems to be more promising than all others.

Ratoon cane.

Yields per acre.

Name of variety.	Weight of cane.	Weight of gul.	Extraction.	Brix.	Average of last 6 years.	
					Cane weight.	Gul weight.
	Lbs.	Lbs.	Per cent.		Lbs.	Lbs.
Co. 290 ..	82,908	10,740	66	21·45	87,930	11,380
Striped D. 109 ..	44,228	5,112	66·25	20·00	55,794	6,378
E. K. 28 ..	40,992	5,068	67	21·45	57,419	7,447
P.O.J. 2878 ..	78,540	9,700	64·25	22·75	77,418	10,028
Pundia ..	22,940	2,696	72	20·22	44,573	4,956
Co. 419 ..	91,476	11,372	67	22·19	..	..

Ratoon of Co. 419 has also given the highest yield. Co. 290 stands next and P.O.J. 2878 stands third. This is the first year of the ratoon of Co. 419 variety. E.K. 28 is not a good ratooner. Average yields of the first five varieties for the last six years are given in the above statement. It will be seen from the same that Co. 290 and P.O.J. 2878 are giving higher yields as ratoon crops.

II. Nitrogenous requirements of cane.—This experiment was tried on E.K. 28 variety and the results per acre are given below :—

Dose Nitrogen per acre.	Plant cane.				Ratoon cane.			
	Weight of cane.	Weight of gul.	Average of 3 years.		Weight of cane.	Weight of gul.	Average of 2 years.	
			Cane.	Gul.			Cane.	Gul.
	Lbs.	Lbs.			Lbs.	Lbs.		
100 ..	56,332	7,620	70,898	9,794	29,124	3,436	55,972	7,132
150 ..	75,476	10,188	88,997	12,092	43,276	5,136	61,054	7,738
200 ..	75,952	10,076	91,710	12,141	60,188	7,324	78,688	9,902

In the case of plant cane, it is observed from the above figures that the yields of the plots treated with 150 lbs. and 200 lbs. are almost equal while the yield of the plot treated with 100 lbs. Nitrogen is much less. The ratoon crop, has however, given higher yields with higher dose of Nitrogen.

III. Adsali cane cultivation.—Three varieties were tried and the results per acre are given below. The planting was done on 4th July 1936.

Plant cane Yields per acre.

October harvesting.

Variety.	Weight of cane.	Weight of gul.	Extraction.	Brix.	Average of 2 years.	
					Cane.	Gul.
	Lbs.	Lbs.	Per cent.			
E. K. 28 ..	91,168	8,480	64·8	17·71	85,372	8,860
P.O.J. 2878 ..	172,608	17,448	61·12	17·82	144,246	15,348

Pundia was not ripe for harvest.

November harvesting.

	Lbs.	Lbs.	Per cent.			
E. K. 28 ..	93,240	9,264	61·25	18·59	90,804	10,118
P.O.J. 2878 ..	184,080	18,448	60·75	19·05	144,024	15,002
Pundia ..	92,760	8,144	63·75	15·54	94,924	8,924

December harvesting.

	Lbs.	Lbs.	Per cent.		Average of 6 years.	
E. K. 28 ..	91,968	11,040	66·5	19·22	91,545	11,064
P.O.J. 2878 ..	151,064	16,824	66·0	20·39	138,790	15,499
Pundia ..	92,824	10,152	70·25	16·57	87,615	9,650

Trials of planting E. K. 28 and P. O. J. 2878 varieties along with Pundia in the first week of July, as Adsali cane, were taken for the last few years. Harvesting was done periodically in the middle of October, November and December. P.O.J. 2878 has given the highest yield as Adsali cane. Brix readings are more in December than in October and November and it will be also seen from the average figures of yield that the outturn of gul is more when harvested in December.

Trial of ratoon of Adsali cane.

Yields per acre.

Variety.	Cane weight.	Gul weight.	Extraction.	Brix.	Average of 2 years.	
					Cane.	Gul.
	Lbs.	Lbs.			Lbs.	Lbs.
E. K. 28 ..	75,160	10,384	68	20·5	67,916	9,040
P. O. J. 2878 ..	115,680	15,376	63	22·3	115,424	14,304

Trial of taking a ratoon crop of E. K. 28 and P.O.J. 2878 varieties from Adsali cane, was started on this farm in the year 1934–35. The results are not available for the years 1935–36 and 1936–37 due to frost attack in January 1935 and hail-storm in March, 1936. The average figures are, therefore given for two years only. P.O.J. 2878 has given much higher yield even as a ratoon crop of Adsali cane. The quality of gul from E. K. 28 was better than that of P.O.J. 2878.

IV. Trial of cane varieties recommended by the Padegaon Sugarcane Research Station.—Co. 360 variety was tried with P.O.J. 2878 in six replicates of 2 gunthas plots each by randomised method. The average yields are given below :—

Name of variety.	Average yield per acre.	
	Weight of cane.	Weight of gul.
Plant cane.	Lbs.	Lbs.
Co. 360	83,833	10,580
P.O.J. 2878	75,523	9,703
Ratoon cane.		
Co. 360	57,480	9,420
P.O.J. 2878	83,487	10,493

Plant cane.

Standard Error is $= \frac{O}{\sqrt{n}} = \frac{64 \cdot 31}{\sqrt{6}} = 26 \cdot 2$

Critical difference for significance is $26 \cdot 2 \times 2 \cdot 2 = 57 \cdot 64$

As the observed difference is 44·0 i.e., less than the calculated difference, none of these varieties is significant.

Ratoon cane.

Standard Error is $= \frac{O}{\sqrt{n}} = \sqrt{\frac{45 \cdot 279}{6}} = 18 \cdot 48$

Critical difference for significance—$18 \cdot 48 \times 2 \cdot 2 = 40 \cdot 656$

As the observed difference is greater (53·66) than the calculated difference, P.O.J. 2878 is significant over Co. 360 in the case of ratoon crop.

Padegaon series.—Ratoon.

Another series of varieties from Padegaon in which E.K. 28 H.M. 89 and Pundia were tried in four replicates of 2 gunthas plots each by randomised method. But during the year under report there was only ratoon crop of this series. The average yields are given below :—

Name of variety.	Average yield per acre.	
	Weight of cane in lbs.	Weight of gul in lbs.
H. M. 89	46,940	5,850
E. K. 28	67,565	9,275
Pundia	55,900	6,305

Comparison between H. M. 89 and E. K. 28.

Standard Error $= \frac{O}{\sqrt{n}} = \sqrt{\frac{11 \cdot 4}{4}} = 5 \cdot 7$ for H.M. 89

Standard error $= \frac{O}{\sqrt{n}} = \sqrt{\frac{32 \cdot 5}{4}} = 16 \cdot 1$ for E.K. 28

Probable Error for H.M. 89 $= 5 \cdot 7 \times \frac{2}{3} = 3 \cdot 8$

E. K. 28 $= 16 \cdot 1 \times \frac{2}{3} = 10 \cdot 7$

Probable error of difference of means :—

$$\sqrt{(10 \cdot 7)^2 + (3 \cdot 8)^2} = \sqrt{128 \cdot 93} = 11 \cdot 35$$

The difference necessary for significance $= 11 \cdot 35 \times 4 = 45 \cdot 40$

As the observed difference between H.M. 89 and E.K. 28 is greater (171·75) than the calculated difference, E.K. 28 is significant over H.M. 89.

Comparison between H.M. 89 and Pundia.

Standard error for H.M. 89 is 5·7

Standard error for Pundia $= \frac{\sigma}{\sqrt{n}} = \frac{58{\cdot}9}{\sqrt{4}} = 29{\cdot}4$

	H.M. 89	Pundia
Probable error	3·8	$29{\cdot}4 \times \frac{2}{3} = 19{\cdot}6$

Probable error of difference of means :—

$$\sqrt{(19{\cdot}6)^2 + (3{\cdot}8)^2} = \sqrt{398{\cdot}60} = 19{\cdot}97$$

Difference necessary for significance—$19{\cdot}97 \times 4 = 79{\cdot}88$

As the observed difference between H.M. 89 and Pundia is less (23·25) than the calculated difference, none of these two varieties is significant.

Comparison between E.K. 28 and Pundia.

Probable error	E.K. 28	Pundia
	10·7	19·6

Probable error of difference of means :—

$$\sqrt{(19{\cdot}6)^2 + (10{\cdot}7)^2} = \sqrt{498{\cdot}65} = 22{\cdot}33$$

Difference necessary for significance $= 22{\cdot}33 \times 4 = 89{\cdot}32$

As the observed difference between E.K. 28 and Pundia is greater (148·5) than the calculated difference, E.K. 28 is significant over Pundia.

Conclusion.—E.K. 28 is significantly superior to both H.M. 89 and Pundia.

V. Trial of Sugarcane Sorghum hybrids.—

February planting.

Yield per acre.

Name.	Weight of cane.	Weight of gul.	Extraction.	Brix.	Average of 3 years.		Age of the crop.
					Cane.	Gul.	Months-days.
	Lbs.	Lbs.			Lbs.	Lbs.	
Co. 352 ..	62,688	7,472	62	21·5	56,035	6,741	10—9
Co. 356 ..	57,024	7,040	65	21	48,293	5,841	

June planting.

Name.	Weight of cane.	Weight of gul.	Extraction.	Brix.	Average of 3 years.		Age of the crop.
					Cane.	Gul.	Months-days.
	Lbs.	Lbs.			Lbs.	Lbs.	
Co. 352..	51,168	5,000	57·25	20·75	53,816	5,592	9—15
Co. 356..	42,960	3,992	54	18·55	59,520	5,571	

It is claimed that these varieties ripen within six or seven months, but it was found that they take about 9 to 10 months under Deccan conditions. The crop planted in June did not give out any arrows and it was harvested in April or May next. The yields are also much less than the average yields of other varieties and therefore, further trials of these will be discontinued.

Trial of new varieties received from Padegaon.

Yield per acre.

Variety.	Weight of cane.	Weight of gul.	Extraction.	Brix.
	Lbs.	Lbs.	Per cent.	
Co. 407	87,060	10,740	63·5	23·63
Co. 408	105,280	12,566	61	20·49
Co. 413	109,440	12,240	66·5	17·70
Co. 419	121,360	15,160	66	19·00

These varieties were received from Padegaon and were grown during the year under report for seed multiplication in one guntha plots in duplicate. Co. 419 stands first and Co. 413 second in this series. Co. 413 is worth trying under different conditions of soil and climate.

VI. Miscellaneous Experiments on other crops.—(*a*) Trial of K-1, K-3 and Spanish peanut varieties of groundnut.

Variety	Area.	Period of growth.	Yield per acre in lbs. (dry pods).
	A. g.		
Sp. nut	0 10	115 days	1,224
K-1	0 20	128 days	1,766
K-3	0 10	105 days	1,444

Kopergaon No. 1 has given the highest yield. K-1 and K-3 varieties were grown on a large scale during the year under report in the area of the Banilla Cotton Scheme and the average yields per acre were obtained as below :—

K-1 16 acres. 1,536 lbs. per acre.
K-3 7 ,, 958 ,, ,, ,,

Plants of K-3 variety get affected by leaf-spot disease while those of K-1 remain in fairly good condition till harvest, and therefore, give more fodder also.

(*b*) Trial of Phaseolus Trilobus as green manure to jowar and wheat crops :—

Treatment.	Yields per acre.		
	Wheat.	Jowar.	
	Grain.	Grain.	Fodder.
	lbs.	lbs.	lbs.
1 Green manuring of Ranmatki ..	990	1,340	2,610
2 Green manuring of Ranmatki and 20 carts of F.Y.M.	980	1,465	3,250
3 Only 20 carts of F. Y. M.	950	1,490	2,700
4 Check plot (without any manure) ..	790	1,120	3,795

Yield of green matter of Phaseolus Trilobus per acre was 6,925 lbs. in wheat plot and 15,460 lbs. in the jowar plot.

The soil in which wheat was grown, was somewhat lighter while the soil in which jowar was taken was heavy and somewhat sticky, being in a low lying situation.

Green manuring with Phaseolus Trilobus has given more yield than the check plot, but addition of farmyard manure has not given encouraging results in wheat. Addition of farmyard manure has given slightly better results in jowar. This experiment will again be tried next year on jowar.

VII. Banilla Cotton Scheme.—This is the fourth year of the Scheme, started on the farm, being financed by the Indian Central Cotton Committee, Bombay, in 1934. Its object is to supply pure Banilla cotton seed to cultivators on the Deccan Canals. The Banilla Cotton is rotated with groundnut. This year, cotton occupied 31 acres and 29 acres were under the groundnut crop. Average yield of

seed-cotton amounted to only 367¾ lbs. per acre while that of groundnut was as below :—

(1) K-1	..1,536	lbs. dry pods per acre.	
(2) K-3	.. 958	„ Do.	
(3) Sp. Nut	.. 577	„ Do.	
(4) U. S. A. G'nut	..1,433	„ Do.	(This is almost the same as K. 3).

2,118½ lbs. Banilla cotton seed and 15,813 lbs. of goundnut seed of K-1 and K-3 varieties were distributed to the cultivators in this year. The crop of cotton was very poor this year. The total expenditure was Rs. 4,567-14-0 while the expected receipts during the year were estimated at Rs. 3,456-1-6. The loss is due to very poor yields and abnormally low price of cotton this year.

VIII. Compost Making.—During the year, compost was made on a small scale from Pachat. Stirring and watering was done twice at an interval of one month. The compost was ready within three months from the date of commencement, i.e. 8th January 1938. It was dug out for spreading in the fields on the 4th April 1938. Nearly 40 cartloads were obtained. The cost of labour amounted to Rs. 30. It will be done next year again on a fairly large scale when more data will be available.

Mohol Farm.

Season.—Similar to last year, the year under report was again marked by want of sufficient rains. The kharif crops like cotton, ground-nut, bajri, failed to grow and most of the cultivators having no facilities for irrigation, grubbed up their crops and made the lands available for rabi sowing. Generally, the August rains are good and soaking and the early September rains become useful for sowing. But this year rainfall in August was very scanty, being only 80 cents as compared with 6·07 inches, i.e., average of three years from 1933 to 1935. Penetration of moisture was not thus sufficiently deep. Cultivators, however, made utmost use of the September rains, which amounted to 6·06 inches and finished sowing. The rain of sowing was also very scanty with the result that on cultivators' fields, the crop was very very poor. The total rainfall from June to December during the year under report was 14·20 inches.

The crop on the farm was far better than on cultivators' fields. The average yield on the farm for 48 acres and 16 gunthas, comprising various types of soil, was 242 lbs. of grain and 495 lbs. of fodder. The maximum outturn on good soil was 365 lbs. of grain and 779 lbs. of fodder while the minimum was 103 lbs. of grain and 220 lbs. of karbi fodder.

The following experiments were conducted on the Farm :—

(1) Dry Farming Experiments.

(2) Jowar Breeding Experiments.

(1) *Dry Farming Experiments.*—These experiments were in continuation of last year. The beneficial effects of dry farming treatments were again more visible, as the season was again most trying for crops. The treatments and average yields of four plots were as below :—

Ploughed.		Harrowed.		Cultivators' method.	
Yield per acre.		Yield per acre.		Yield per acre.	
Grain.	Fodder.	Grain.	Fodder.	Grain.	Fodder.
lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
409	799	389	762	134	231

(2) *Jowar Breeding Experiments.*—Out of the four Maldandi strains, strain No. 31-2 being late and small grained was dropped from the trial and only three Maldandi strains Nos. 35-1, 47-3 and M-9 were tried against local, graded and rejected in Fisher's Randomised block system, with four replications and one guntha plot for each strain within a block.

The average yield figures are as below :—

Strain No.	Yield of grain.		Yield of fodder.	
	Yield per plot of one guntha.	Yield per acre.	Yield per plot of one guntha.	Yield per acre.
	lbs.	lbs.	lbs.	lbs.
35-1	12·25	490·00	24·94	997·60
47-3	12·43	497·20	23·53	941·20
M-9	11·68	467·20	30·38	1,251·20
Local	8·82	352·80	29·53	1,181·20
Graded	10·16	406·40	25·59	1,023·60
Rejected	7·57	302·80	28·50	1,140·00

Standard error of the experiment is $\sqrt{2 \cdot 2521} = 1 \cdot 501$ and the standard error for comparison of two variety means is $= 1 \cdot 061$. After working out the figures for 2 tests, it is found that the experiment is significant. Observed Z ·9713 being greater than expected Z—·5326 for 5 per cent. chance. All the strains show significant superiority over local. Again strain No. 35-1 proved its high merit by earliness, high yield and bigger size of grain.

Valuation of jowar strains.—Similar to last year, jowar samples were sent for valuation in Mohol bazar with the following result:—

Strain No.	Rate per bag of two maunds, i.e., 128 seers by measure weighing 224 lbs.	Net gain per bag of 224 lbs. over local.	Percentage increase or decrease over local.
	Rs. a. p.	Rs. a. p.	
35-1	6 8 0	0 14 0	15·5
47-3	5 14 0	0 4 0	4·4
M-9	6 2 0	0 8 0	8·9
Local	5 10 0	....	....

Yield tests of Dagadi strains.—A yield test as per Fisher's method was arranged wherein the four old Dagadi strains, viz., N. D. 15, B. D. 24 and B. D. 34 and B. D. 29 were tried against local Dagadi from Nagar and Bijapur. The number of replications was four and the plot size was one guntha. The results are given below:—

Strain No.	Yield of grain.		Yield of fodder.	
	Yield per plot of one guntha.	Yield per acre.	Yield per plot of one guntha.	Yield per acre.
	lbs.	lbs.	lbs.	lbs.
N. D. 15	11·22	448·80	18·50	740·00
B. D. 24	9·23	369·20	17·81	712·40
B. D. 34	11·14	445·60	17·56	702·40
B. D. 29	9·67	386·80	20·63	825·20
B. D. Local	10·77	430·80	21·19	847·60
N. D. Local	10·35	414·00	16·25	650·00

Standard error of the whole experiment is 0·9598 and the standard error for comparison of two variety means is ·6788 when the figures are worked out for " Z " test it was found that the figure for observed " Z " is ·5160 while the expected " Z " for 5 per cent. chance is ·5326, showing thereby that the experiment is not significant.

Ratnagiri Farm.

Season.—The season during the year under report was below normal. Monsoon started with heavy and continuous rains with the result that the germination of rice seed in the rabbed seed-beds was not satisfactory. Tillering was also quite meagre. Transplanting had to be finished with the fewer number of seedlings in a bunch. The upland rice was benefited to a great extent but the mid-late and late varieties yielded only two-third of the crop of the last year. The nagli crop was satisfactory on the whole. The total rain-fall during the year amounted to 103·52 inches as against 97·14 inches of the last year.

The farm work comprises of the following :—

(1) Rice breeding, selection and multiplication.

(2) Fruit section and nursery.

(3) Vegetables.

(4) Nagli work at Hatkhamba.

(1) *Rice work.*—The main work of the multiplication of different strains of rice was done as usual. The quantities of seed supplied during the season of 1938 to registered seed growers were as under :—

		lbs.
Early (coarse) ..	.. Patni No. 6 ..	3,207
Intermediate (medium)	.. Panvel No. 61 ..	2,178
	Waksal No. 207 ..	2,419
Intermediate (fine) ..	.. Kolamba No. 184 ..	1,466
	Kolamba No. 401 ..	2,092
Late (coarse) ..	.. Bhadas No. 79 ..	173
	Total ..	11,535

There is no demand for Kudai No. 25 and hence it will be discarded from the next year's cropping scheme.

The trials of the late Varangal strains at Chiplun were concluded this year after the experience for " 4 years ". Strain No. 487 proved superior and has thus maintained its reputation for all the four years of the trial. This year it gave an increase of 17·34 per cent. in its yield when compared to check. Varangal No. 420 yielded 10·98 per cent. more grain while Varangal No. 448 yielded less than the check.

The strain No. 487 will now be put to village trial from next year.

Along with the selection of Varangal strains, the trials of the new Fine Waksal Strains (selections) which were also conducted at Chiplun, were brought to an end. Strain No. 1 which has all along maintained its superiority yielded 21·7 per cent. more grain than the check while strain Nos. 3 and 27 gave an increase of 16·66 and 7·40 per cent. respectively. From next year, the strain No. 1 will also be sent into the district for village trials.

As regards work on crosses, the only selection No. 17-23 which has now been retained for further selection, was grown in F7 generation. This year there was not much splitting of the strain to be found and the seed also remained free from store pest. The strain will be tried in F8 generation for further selection, if any.

Selection No. 4-7 of the cross which has been set aside to compare its yield with Patni No. 6, though proved superior again to the latter by giving 20·8 per cent. more yield, was found to be fairly attacked by store pest.

(2) *Fruit Section and Nursery.*—The fruit crops in general, are growing satisfactorily.

During the year under report, an area of 24 gunthas has been laid out under " kew " variety of pine-apple with a view to find out how best the suckers of this variety could be produced for distribution purposes. Suckers of various ages from 3 to 7 months have been taken for planting and distance between the plants also varies in the different sub-plots.

It has been decided to keep only a small area on the farm under the " queen " variety and to extend the cultivation of the " kew " as much as possible, to meet the increasing demand of the suckers of the latter variety. The size of the fruit of the kew variety is on an average double that of the queen and hence its cultivation in the district from the point of income has necessarily to be encouraged.

The *guava* trees are flourishing immensely. The plants are now bearing satisfactorily and will be treated for Mrigbahar from the next year. There is a good demand for the fruits as well as for the grafts.

Mosambies and *Santras* have also started yielding fruit to some extent. The plants are healthy and have made a good growth during the last three years. The fruits will be tested for their quality when they ripen next year.

Chikoos yielded a small crop during the year under report. The fruits are very tasteful.

Sour-limes, it seems, will begin to bear from the next year. The plants do not seem to be quite healthy. *Italian lemons* are growing nicely and are free from any disease. However, there is not much demand for this fruit.

Mangoes did not yield a satisfactory crop this year, as they had a profuse flowering last year. George variety yielded some fruits which generally ripe during monsoon. It is a big sized fruit and has a fairly good taste.

The mango seedlings *in situ* on the Hatkhamba farm have been successfully budded.

Nursery.—This side of farm work is much appreciated by the public. It has also a great scope for extension in all its sides particularly mango grafts and kew pine apple suckers. While the expenses in maintaining the nursery, work out to Rs. 180 per year, the income realised from the sale of plants amounts to Rs. 900 on an average.

(3) *Vegetables.*—The only popular vegetables—brinjals, cabbage, chillies, knolkhol, bhendi and tondali were grown as usual. It is our experience that tomatoes do not flourish on this farm as they are mostly subjected to wilt disease during the flowering period. The total sale proceeds from vegetables amounted to Rs. 200 against the cultivation charges of Rs. 82.

(4) *Nagli multiplication work.*—The multiplication of the improved strains of Nagli—A16, B11, E31, E82, E44 and E62 was done on the Hatkhamba farm as usual. The purity of the seed has been maintained by discriminate roguing and bagging enough ear-heads of each of the strains. The total quantity of seed distributed to the registered seed growers during the season of 1938 was 2,808 lbs.

The Hatkhamba farm having now been closed from 1st May 1938, the work of the multiplication of the nagli strains will be taken up near Ratnagiri Farm.

(5) *Premium bulls.*—The Pandharpuri " buffalo bull " issued by the Taluka Development Association, Ratnagiri, for maintenance on the Ratnagiri farm on 20th September 1936, started giving service from the beginning of January 1938. The animal is now nearly 4 years old and has served so far 8 she-buffaloes.

The " Gir " bull, which is now about 8 years old has been found to be too heavy for the weak dwarf cows on this side. Only one cow was served during the year under report.

Section III.

Propaganda.

The principal items of propaganda are given below :—

(1) *Treatment of jowar seed against smut.*—The propaganda of mixing jowar seed with sulphur dust was carried out on a large scale, and the following packets were distributed this year :—

Name of the district.	Number of of packets sold.	Area estimated under treated jowar.
		Acres.
(1) Poona	1,000 plus old packets available.	15,000
(2) Satara	5,750	25,500
(3) Ahmednagar	1,786	8,500
(4) Sholapur	9,277	58,777
(5) Canal tract	8,327	42,927

On account of the scarcity conditions of the last year, a large number of packets remained undistributed, which were used by the cultivators in the current year. Hence the total number of packets distributed, and the treated area is smaller as compared with that of the last year.

(2) *Seed grading.*—This work was continued as usual and the following quantities of seed were graded :—

Kind of seed graded.	Poona.	Ahmed-nagar.	Sholapur.	Satara.	Canal tract.	Total.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Bajri ..	21,000	5,536	....	4,800	4,550	35,886
Jowar ..	34,600	30,250	1,11,000	62,800	21,900	2,60,550
Wheat ..	8,350	7,452	6,500	....	7,225	29,527

During the year, special trials of the following varieties were arranged in four replications by Fisher's randomised method on the four canals and their results are given below :—

Name of variety.	Average yield of all the trials on four canals.
	Gul in lbs.
(1) Co. 360	10,768
(2) Co. 419	14,162
(3) P. O. J. 2878	12,277
(4) E. K. 28	10,387
(5) Pundia	7,325

From the above yield figures, Co. 419 is the highest in yield ; next is P. O. J. 2878 and Co. 360. Co. 360 is superior to Pundia in yield, while E. K. 28 is almost equal to Co. 360.

During the year under report, the following sets of sugarcane varieties were distributed on the Deccan Canals, at concession rate :—

Name of variety.	Number of sets distributed.
(1) E. K. 28	127,900
(2) P. O. J. 2878	75,400
(3) Co. 360	90,000
(4) Co. 419	150,000
(5) Co. 290	40,000

The area under these varieties is gradually increasing and the following approximate area is given under the different varieties on the Deccan Canals, during the year under report :—

Name of variety.	Area on Deccan Canals in 1937–38.	
	Planted by cultivators.	Planted by Sugar factories.
E. K. 28	4,237	1,757
P. O. J. 2878	2,198	4,145
Co. 360	75	75
Co. 419	750	603
Co. 290	50	2,560
Pundia	9,250	....
Co. 413	10	10
Co. 407	5	112 including Co. 205, 285, 402, 417.
Co. 408	5	
Total ..	16,580	9,262

During this year, the experiment of applying 100 lbs. of P_2O_5 in the form of Superphosphate was continued, and the results are given below :—

Treatment.	Yield of gul per acre.
	lbs.
(1) 100 lbs. of P_2O_5	10,871
(2) Control	10,065

After deducting the cost of manure, the extra profit varies from Rs. 12 to Rs. 38 per acre, according to the fluctuating prices of the gul.

(4) *Introduction of Banilla and Jayawant Cotton*—(A) *Banilla Cotton.*—On the Deccan Canals, about 2,000 lbs. of pure Banilla seed was distributed to the registered seed growers from the Kopergaon Farm. In addition to this 60,000 lbs. of Banilla seed from the last year's seed growers was distributed on different canals. Besides the Agricultural Requisite Societies of Belapur, Malsiras and Taluka Development Associations have distributed large quantities of Banilla seed and the total area under Banilla must be about 10,000 acres. As usual, newly sown cotton crop was badly attacked by green caterpillar and as a result, the average yield per acre was not more than 400 lbs. of kapas.

On the Nira Left Bank Canal, the percentage of wilt is gradually increasing, and hence in the current year, Jarilla cotton is being tried in some centres.

On the Pravara Canal a wilt-resistent and finer variety, viz., B. D. 8 is also given for trial.

In the dry tract of the Ahmednagar district, the Agricultural Requisite Society at Shevgaon and Pathardi has distributed 34,260 lbs. of Banilla seed, while the Taluka Development Association at Jamkhed has distributed 3,700 lbs. of Banilla seed. The demand for Banilla cotton seed is rapidly increasing even in the dry tract.

Trials of artificial manures on cotton, mentioned on page 112 of the last year's report were also conducted and the results are given below :—

Treatment per acre.	Yield of seed cotton per acre.
	lbs.
(1) 25 lbs. of Nitrogen from Sulphate of Ammonia.	681
(2) Control	567

As the rates of cotton were very low, the extra yield has hardly paid the cost of manure.

(B) *Jayawant cotton.*—This was the second year of the Scheme of Jayawant cotton arranged according to the instructions of the Indian Central Cotton Committee. This year it has covered 2,500 acres, under Jayawant in Walwa and Tasgaon talukas of Satara district. However, the season was not favourable. In order to secure fair prices for Jayawant over the Kumta cotton, two open auction sales were arranged at Sangli, with the aid of the State Authorities. The Jayawant cotton was sold at a premium at Rs. 8 to 10 per cart (1,200 lbs. of kapas) by open auction sale. The rate of local Kumta cotton was $7\frac{1}{8}$ seers per rupee while Jayawant cotton was auctioned at $6\frac{3}{8}$ seers per rupee. Arrangements were made to gin the Jayawant cotton separately and the seed (650 bags) was arranged to be purchased and stored at different places, in Tasgaon and Walwa talukas.

(5) *Groundnut.*—As mentioned on page 113 of the last year's report, the area under groundnut is increasing and the new varieties, viz., Kopergaon No. 1 and No. 3 are becoming more popular. During the year under report, about 22,000 lbs. of Kopergaon No. 1 and about 8,000 lbs. of Kopergaon No. 3 were distributed on the Deccan Canals. Comparative trials of these varieties were taken at different places and their average yield is given below :—

Name of variety.	Yield of dry pods per acre.
	lbs.
(1) Spanish peanut	1,217
(2) Big Japan	1,409
(3) Kopergaon No. 1	1,540
(4) Kopergaon No. 3	1,701

(6) *Akola Bajri.*—The demand for Akola bajri is increasing year after year, but on account of the very poor crop of bajri in the Sangamner and Akola talukas, in the last year, only 5,536 lbs. of seed was supplied. This was tried in many places and the average yields of the dry and irrigated crops are given below :—

Name of variety.	Yield per acre.	
	Dry.	Irrigated.
	lbs.	lbs.
(1) Akola bajri	425	765
(2) Local bajri	272	651

The craze for African bajri is gradually decreasing, although some cultivators on the Nira Right Bank Canal and in Satara district are still continuing to grow the African bajri.

(7) *Wheat strains.*—The Pusa Nos. 4 and 111 were in great demand this year, but hardly 5,000 lbs. of fresh Pusa wheat were available from Karnal farm. This was distributed to several seed growers for multiplication. The natural spread of Pusa wheat has greatly increased and in Satara district, 53,262 lbs. of Pusa wheat seed was distributed, from last year's seed growers' stock.

The area under Pusa wheat has been also increased in the Poona district and the area under this wheat must be about 15,000 acres, in Maval taluka and Shirur Peta.

Comparative trials of Pusa and local, were made both in the dry and irrigated tracts and the average yields are given below :—

Name of Locality.	Name of variety.	Yield per acre.	Remarks.
		lbs.	
(1) Talegaon	Pusa wheat ..	1,728	Irrigated.
	Local wheat ..	1,050	
(2) Shikrapur	Pusa wheat ..	1,025	Do.
	Local wheat ..	520	
(3) Korti village ..	Pusa wheat ..	480	Dry.
	Local wheat ..	430	

Bansipalli strain No. 808 was again tried along with the local Bakshi wheat in Ahmednagar district and comparative yields are given below :—

Locality.	Yield of strain No. 808 per acre.	Yield of local per acre.
	lbs.	lbs.
(1) Sangamner	253	208
(2) Parner	392	224
(3) Newasa	495	407
(4) Akola	620	520
(5) Ahmednagar	660	583

Sann green manure was also tried for wheat crop and its results are given below :—

Name of trial.	Yield per acre. lbs.	Remarks.
(1) Sann green manure ..	1,344	Irrigated.
(2) No manure	512	

Similarly, 80 lbs. of Superphosphate *plus* 100 lbs. of Nitrate of Soda were applied to wheat crop per acre—the former before sowing and the latter a month after sowing—and the results are given below :—

Treated plot.	Yield per acre.
	lbs.
(1) Treated plot	1,106
(2) Control	923

(8) *Improvement of rice.*—The work mentioned on page 115 of the last year's report, was continued in the Ratnagiri District. In all 11,550 lbs. of seed of Patni No. 6, Kolamba No. 184, 401, 42, 412, Panwel 61, Bhadas 79 and Waksal 207 were distributed to 160 registered seed growers, through the Taluka Development Associations. This seed was sufficient for 195 acres. The produce of this area, viz. 250,000 lbs. was distributed to the cultivators of the second stage and it was sufficient for 4,000 acres.

Besides there was a large area under natural spread of these rice strains.

Intensive propaganda has been made to concentrate this seed multiplication work in a number of villages by supplying the seed on exchange basis on the condition of returning the produce at 12½ per cent. premium. This method has become very popular as the cultivators are not required to pay anything in cash for their seed.

In this connection, the example of the Taluka Development Association, at Dapoli is worth mentioning. It has purchased 4,000 lbs. of pure seed from the Ratnagiri Farm, for multiplication and has also purchased 10,000 lbs. of seed from the registered seed growers, for giving the seed on exchange basis. In order to develop this work, more rapidly, the Collector of Ratnagiri has been requested to grant Rs. 500 from the Village Improvement Fund, to each of the Taluka Development Associations, to undertake the work of rice seed distribution.

(9) *Improved Nagli strains.*—The work mentioned on page 116 of the last year's report, was continued in the Ratnagiri District, and about 1,940 lbs. of nagli seed was distributed amongst 105 registered seed growers. This was sufficient for 190 acres. This area produced 75,000 lbs. of seed, which was distributed through the Taluka Development Associations, to the cultivators on exchange basis.

(10) *New jowar strains.*—The Maldandi strains No. 47-3, and 35-1 have become very popular in all the districts of Deccan and the demand is constantly increasing. The Taluka Development Associations of Madha, Karmala, Barsi and Sholapur have arranged the multiplication of these strains and have stocked more than 10,000 lbs. by each Association. Comparative trials of these strains with the local jowar, were arranged in all the districts of the Deccan and everywhere it has given from 20 per cent. to 25 per cent. more yield. The strain No. 35-1 which is earlier

than the strain No. 47-3, is more in demand and all the Associations are now arranging the multiplication of this seed.

(11) *Crop Pests and Diseases.*—During the year under report, the grasshopper pest on sugarcane was very serious on the Pravara Canals. During the last year, about 300 acres of cane was affected by this pest, and people were advised to plough their lands and destroy the egg-masses. But they have not paid close attention to this recommendation and as a result the pest has increased over an area of 1,400 acres of cane. All control measures, such as bagging the grasshoppers, and destroying them; catching the hoppers on tarred boards, especially on the borders and the water-channels and dragging the grasshoppers off the grown up sugarcane to a net, containing molasses; flooding the water channels with crude oil and also with sweet oil mixed with kerosene; were undertaken on a large scale, but the pest appeared again and again, from fallow lands and grass areas round about sugarcane and good deal of damage has been already done to the crop.

The Department has given a special grant of Rs. 567 while the Maharashtra Sugar Mills, Limited, and the Taluka Development Association, Rahuri, have contributed a sum of Rs. 333 and Rs. 1,000 respectively.

This pest has also affected about 600 acres of cane of the Maharashtra Sugar Mills, but by adopting the control measures mentioned above, they have brought the pest under control.

The Department engaged three additional Kamgars for this work and the question of control of this pest is specially engaging the attention of the Department.

The Honourable Minister of Revenue and Agriculture had visited the affected area and discussed the matter with the cultivators.

Irrigated cotton crop was very badly affected by green caterpillars in the young stage and the yields have been reduced by 50 per cent. The trouble of wilt was also observed on the Nira Left Bank Canal.

Jowar crop was affected by a sugary disease called "Chikta" and by smut to a certain extent. The potato crop in Poona and Satara Districts was attacked by rust, but the disease was not so severe. The peas in Poona and Satara Districts was affected by mildew and sulphur dusting was extensively adopted. Cabbage, Knolkhol and lucerne were also seriously affected by Aphis. Die-back disease was also observed in several citrus gardens of Ahmednagar District and a new root disease on Mosambi was also observed and discovered.

In Ratnagiri District, mango crop was seriously affected by hoppers and mildew and in some places it could not be checked even by repeated dusting. Twenty-five new dust guns have been supplied to the cultivators and the number of such machines, working in this district, is 225. The mango crop, however, was very poor on account of the larger percentage

of male flowers this year. There was also an attack of swarming caterpillars on rice in Vengurla Peta and the remedy of keeping a thin layer of rock oil on the water impounded in the fields was found successful. In Sangameshwar taluka, there was an attack of leptisa beetle on the rice crop in the month of September. Koleroga disease on Supari was also more serious in Vengurla Peta and the spraying with Bordeaux mixture was adopted over an area of 25 acres.

(12) *Fruits and vegetables.*—The extension of fruit cultivation is continuously going on and in Satara District, 31 villages have been specially selected for the development of fruit. The Taluka Development Associations have distributed 2,626 mango grafts, 17,261 Mosambi plants and about 5,000 miscellaneous fruit trees. The tree planting is systematically undertaken and about 10,000 plants have been planted on the Nag Panchami day.

Similar activity is also seen in Ahmednagar and Sholapur Districts. There was greater demand for the seedlings of Mosambi and oranges at Talegaon Dhamdhere and about one lakh of plants have been supplied from this centre.

In Ratnagiri District, 2,000 suckers of "kew" pine-apple were distributed in Malwan and Dapoli Talukas, while 6,000 suckers of "queen" pine-apple were supplied. The demand for vegetable seedlings is constantly increasing and the eight Taluka Development Associations in Ratangiri District have supplied 1½ lakhs of seedlings this year.

Potato crop has been newly introduced in the Ratnagiri District, where it has given the yield of eight times the seed rate.

The Departmental staff has supplied 3,000 mango grafts, 100 Banawali cocoanut seedlings and 200 citrus plants. At Mahableshwar, vegetable seeds were directly ordered from Messrs. Dobbie & Co., of Scotland.

Four new varieties of potatoes were also ordered from Scotland and tried at Mahableshwar, along with the local Italian seed, and their yields are given below :—

Name of variety.	Yield per acre.
	Lbs.
(1) Door star	13,000
(2) Arran Banner	13,800
(3) Arran Pilot	15,200
(4) Red skin	13,200
(5) Local Italian	10,000

The produce of these varieties has been kept for further multiplication.

In Poona District about 50,000 lbs. of Scottish Epicure potato variety was supplied to the cultivators with the help of Tagai grant. But during this year about 50 cases of the potato seed were damaged in the transit. The results of comparative trial of the Epicure and Italian potatoes are given below :—

Locality.	Name of variety	Yield per acre.	Remarks.
		Lbs.	
(1) Shiravali	Epicure ..	8,787	Local.
	Local ..	8,992	Manure.
(2) Kharpudi	Epicure ..	8,580	Local.
	Local ..	6,960	Manure.

A few plots of potato artificial manure, recommended by the Department, were also laid out and the average results are given below :—

Locality.	Yield per acre.	
	With manure.	Without manure.
	Lbs.	Lbs.
(1) Shiravali	10,252	9,320
(2) Chatran	9,836	8,528

(13) *Sugar making.*—During the current year, the prices of gul were increased; consequently there was no advantage in manufacturing sugar by the open pan process. Two cultivators on the Pravara canal, viz. Mr. Kisa Bahiru Bangal and Mr. Magniram Fakirchand, prepared sugar by the open pan process, and the total output in both the cases was about 500 bags. The recovery of first sugar varied from 5·8 to 6 per cent. When the prices of gul began to rise, they had to stop this work. The Brihan Maharashtra Sugar Syndicate had also prepared about 1,000 bags of sugar with the machinery given to them on hire by the Department, but they too had to close this work on account of the rise in gul prices.

(14) *Sugar factories.*—During the year, there was no change in the number of sugar factories in the Deccan, but the capacity of several factories was increased and the total output of sugar was 54,450 tons.

The details of the area under sugarcane, capacity of the factory, total output of sugar, etc., are given below :—

Name of sugar factory.	Area under sugarcane (excluding overlapping).		Capacity of factory per day.	Total output of sugar during the year.	Quantity of cane purchased from outside cultivators.
	A.	g.	Tons.	Tons.	Tons.
(1) Belapur Company Ltd., Post Harigaon, District Ahmednagar.	2,750	5	660	12,728	700
(2) Marsland Price & Co., Ltd., Sugar Factory at Kalamb, District Poona.	1,568	0	600	7,748	9,170
(3) Kolhapur Sugar Works Ltd., Sahupuri, Kolhapur.	978	0	400	5,358	15,488
(4) Phaltan Sugar Works Ltd., Sakharwadi, Phaltan State.	2,229	20	500	9,328	9,918
(5) Ravalgaon Sugar Farm Ltd., Ravalgaon, District Nasik.	1,133	20	300	4,783	2,092
(6) Maharashtra Sugar Mills Ltd., Tilak Nagar, via Belapur Road, District Ahmednagar.	3,595	13	700 to 800	10,372	7,362
(7) Belwandi Sugar Farm Ltd., Belwandi, District Ahmednagar.	490	0	200 to 250	1,073	339
(8) Saswad Mali Sugar Factory Ltd., Akluj, District Sholapur.	827	20	200	3,060	..
(9) Brihan Maharashtra Sugar Syndicate, Sugar Factory at Borgaon, Taluka Malsiras, District Sholapur.	Figures not available.				

(15) *Shows and Demonstrations.*—During this year, the programme of Agricultural Shows was very much curtailed and more attention was paid to field demonstrations and Jamabandi meetings. In Satara District, however, one big agricultural show was arranged at Khatgun, by the Taluka Development Association, Khatav. It was attended by 500 people. At Sholapur All-India Swadeshi Exhibition was arranged in which special Agricultural section was arranged. This show lasted for a fortnight, and was very much appreciated by the public. It was attended by more than 30,000 visitors. A third show on a moderate scale was arranged at Chiplun, which was attended by 200 people. At Mirjola, near Ratnagiri, a special Agricultural and Industrial Exhibition was arranged which was attended by 500 visitors.

At Kondhanpur, the Deccan Agricultural Association had arranged an agricultural show, which was attended by 5,000 people. In Ahmednagar District, an agricultural show was arranged at Jamkhed which was attended by more than 1,000 people. A similar show was arranged at Shrigonda, which was attended by 2,000 people. In Ahmednagar District, six more exhibitions were arranged, out of which the exhibition at Akola was opened by the Honourable Finance Minister. The other exhibitions, arranged at Miri, Newasa, Kukana, Shevgaon and Bodhegaon, were opened by the Commissioner, C. D., and the Collector of Ahmednagar. The attendance to these exhibitions varied from 1,000 to 10,000 people.

Besides these big shows, following number of small demonstrations were arranged in this Division :—

(1) In Satara, 54 crop demonstrations ; 14 demonstrations at the time of fairs ; and 14 demonstrations at Jamabandi meetings were arranged.

(2) In Poona District, 27 crop demonstrations and 2 demonstrations at the time of Jamabandi meetings were arranged. Besides, the Agricultural staff has given 25 magic lantern lectures on agricultural improvements.

(3) In Sholapur District, 4 demonstrations at the time of Jamabandi meetings and 110 demonstrations of the standing crops were arranged.

(4) In Ahmednagar District, 40 small demonstrations and 6 Jamabandi meetings were held.

(5) In Ratnagiri District, 80 field demonstrations were arranged during the year under report.

(16) *Agricultural Classes.*—In Ahmednagar District, a special class on Irrigated crops was arranged at Kopergaon Farm, to train the fieldmen of the Taluka Development Associations and surrounding cultivators. A similar class was also arranged at Miri for the cultivators of the dry tract. A class for training non-official agents was also arranged at Poona, Ahmednagar, Pandharpur, Vaduj and Ratnagiri, in which about 200 agents were trained in simple improvements of agriculture. The information about the bunding classes is given in the chapter on Agricultural Services.

The training classes of canning and preserving fruits were also arranged at Ratnagiri, Malwan and Vengurla.

(17) *Demonstration plots.*—During this year, the following number of demonstration plots were arranged in this Division :—

Name of District.	Number of plots.
(1) Canal tract	546
(2) Poona District	68
(3) Sholapur District	169
(4) Satara District	81
(5) Ahmednagar District	212
(6) Ratnagiri District	130
Total ..	1,206

(18) *Taluka Demonstration Centres.*—During the current year, Government have launched a new scheme of arranging taluka demonstration centres, in the fields of cultivators and one special Kamgar is to be located at each centre. Roughly a non-recurring grant of Rs. 450 has been provided for each centre for the purchase of implements, seeds, etc., while a recurring grant of Rs. 300 has been provided as under :—

	Rs.
(*i*) Annual grant to the cultivator on whose land the taluka agricultural demonstration centre will be established.	150
(*ii*) Rent of accommodation for resident Kamgar and for seed and implement depot.	72
(*iii*) Miscellaneous expenditure, e.g. stationery, postage, horticultural materials, etc.	78
Total ..	300

Accordingly the following centres have been selected in the current year :—

(1) In Poona District at Khed, Kondapuri (Shirur Peta) and Baramati (Bhimthadi Taluka).

(2) In Ahmednagar District at Mahi-Jalgaon (Karjat Peta), Shevgaon and Yesgaon (Kopergaon Taluka).

(3) In Sholapur District, at Tembhurni (Karmala Taluka), Madha and at Malsiras.

(4) In Satara District at Vaduj (Khatav Taluka), Tasgaon and Umbraj (Karad Tuluka).

(5) In Ratnagiri District at Kankavli (Deogad Taluka) and at Devrukh (Sangameshwar Taluka).

According to the scheme, 14 new Kamgars have been appointed and they have been entrusted with this work.

(19) *Gift Bull Scheme.*—During the year under report, the following breeding-bulls were purchased and located at different places, according to His Excellency the Viceroy's "Gift Bull Scheme". The Village Improvement Committees also have purchased some bulls and the information is given in the following table :—

Name of the district.	Bulls purchased according to His Excellency the Viceroy's Gift-Bull Scheme.	Bulls purchased from the funds of the Village Improvement Scheme.
(1) Poona	2	10
(2) Satara	26	....
(3) Ahmednagar	2	....
(4) Sholapur	2	....
(5) Ratnagiri	2 and one buffalo.	....

(20) *Rural Uplift Work.*—During the year under report, the different Village Improvement Committees have done the following Agricultural Work :—

(1) The Village Improvement Committee, Sholapur, had contributed small amounts to all the Taluka Development Associations, for the purchase of seeds and agricultural implements. A small depot of ploughs has been maintained at Kumbhari centre for giving the ploughs on hire to the cultivators at concession rate. The Village Improvement Committee had arranged to plant 2,000 trees on 11th August 1937 (Nag Panchami day) throughout the district. A Publicity Van had toured in this district in December 1937 and visited 45 villages. The staff of the Agricultural Department had accompanied this Van and delivered lectures and arranged demonstrations of the different exhibits. The Village Improvement Committee had arranged 2 poultry centres at Kumbhari and Khardi at a cost of Rs. 1,113 and Rs. 973, respectively. A total grant of Rs. 1,400 is given to several taluka development associations and a grant of Rs. 800 to different taluka village improvement committees, for arranging libraries. The Village Improvement Committee had also maintained one Bunding Sub-Overseer and a Khalashi to work under the Bunding Officer, S. C. D., Poona.

(2) The Village Improvement Committee, Ahmednagar, had provided a sum of Rs. 3,000 to all the Taluka Development Associations in Ahmednagar District and had also given Rs. 2,000 as a reward to the

villagers who had done good work. It had provided Rs. 610 for model bunding schemes in the district. The V.I.C., has also maintained one Bunding Sub-Overseer, and a Khalashi who has made a survey of 110 acres during the year under report.

(3) The Village Improvement Committee, Poona, had contributed 1,000 rupees to the ten taluka development Associations and a special grant of Rs. 100 was given to the Taluka Development Association, Bhimthadi, for purchase of Agricultural implements. A Bunding Sub-Overseer and a Khalashi were also appointed for carrying out the Bunding operations and the total expenditure on this account came to Rs. 809. Besides, in the budget of 1937-38, the V.I.C., had granted Rs. 600 to meet half the cost of 4 stud bulls, and Rs. 140 for their maintenance charges. It had sanctioned Rs. 300 for six poultry centres in the district.

(4) The Village Improvement Committee, Satara, had granted Rs. 3,971 for the Agricultural Improvements, such as supply of pure seeds (Rs 1,300), purchase of implements (Rs. 2,296), purchase of 1,300 mango grafts for giving them to cultivators, at annas eight per plant (half price). It had also arranged to plant more than 10,000 plants on Arbor day, throughout the district. Thirteen agricultural classes were arranged and the demonstration Van visited 51 villages.

(5) The Village Improvement Committee, Ratnagiri, had granted Rs. 500 as a subsidy for the Kankavli Show in the year 1937-38, while in the current year, it has provided Rs. 3,110 for the following items :—

	Rs.
(*i*) Poultry Farm	400
(*ii*) Purchase of 20 dusting machines ..	780
(*iii*) Sprayers and material for Bordeaux mixture.	70
(*iv*) Stud bulls	500
(*v*) Improved Implements	360
(*vi*) Improved seeds	1,000
Total ..	3,110

(6) *Deccan Agricultural Association, Poona.*—The Deccan Agricultural Association continued its activities of Rural Uplift during the year under report. The Association has a centre of work at Khed-Shivapur and its activities are carried on in the Shivapur valley, in about 14 villages. The main activities include improvement in agriculture, offering medical facilities to the rural people and starting and maintaining primary schools in the villages under the centre.

The Agricultural work was concentrated on the use of iron ploughs, selling of good and pure pea seed, pusa wheat, etc. Dusting of sulphur and other remedies against plant disease and insect attack were done

on a large scale than in the previous years. It is gratifying to say that these activities are appreciated by cultivators and they are of their own accord going in for improved seed and dusting of the pea crop.

Primary schools have now been established in practically all the villages and the village people are now showing signs that they want schools and would not favour the idea of closing the schools.

The medical help rendered, is being taken advantage of by larger and larger number of people. During the year under report, medical help was given to 1,400 patients and about 16 labour cases were attended. This is a distinct progress over the past year.

The Association arranged for an Agricultural show at Kondhanpur, as usual and there was a conference held at Khopi, where over 500 people gathered from all the villages of the valley and the questions of rural improvements were discussed freely and at great length. The agriculturists showed that they were keen on improving their condition and appreciated the attempts made by the Deccan Agricultural Association.

(21) *Publications.*—During the year under report, the following leaflets were revised and completed :—

Serial No.	Name of leaflet.	English.	Marathi.	Remarks.
1	Control of the grain smut in jowar.	..	M.	Leaflet No. 7 of 1937.
2	Manure of Pachat for sugar-cane.	E.	..	Leaflet No. 10 of 1937 (replaces leaflet No. 11 of 1916).
3	Citrus Gummosis	..	M.	Leaflet No. 8 of 1937 (replaces leaflet No. 7 of 1931).
4	Common salt and its use as manure in the Konkan.	E.	M.	Leaflet No. 3 of 1937.
5	Cultivation of Bananas ..	..	M.	Leaflet No. 3 of 1915 (revised).
6	Improved rice strains in B. P. ..	E.	M.	Leaflet No. 1 of 1937.
7	Use of Iron Ploughs in Konkan.	E.	..	Leaflet No. 5 of 1915 (revised 1937).
8	The sweet potato crop in the Konkan.	..	M.	Leaflet No. 2 of 1923 (revised 1937).
9	Silage making in Kacha pits ..	E.	..	....
10	Improved strains of wheat in the B. P.	..	M.	Leaflet No. 2 of 1937.

Besides, the staff of this division have contributed many articles to local news-papers and magazines, on the methods of improved agriculture, use of improved seeds and implements, etc. The Deputy Director of Agriculture gave two talks on agricultural improvements in Thana and Kolaba Districts at Bombay.

Section IV.

Agricultural Organization.

(1) *Taluka Development Associations.*—There is no change in the number of the Taluka Development Associations in the South Central Division. The total number of Associations is 49. Proposals for registering one more Taluka Development Association for the Shirala Peta has been submitted to the Registrar. The work of controlling these Taluka Development Associations has been enormously increased as good deal of correspondence is required to be done for the working of these Associations. During the current year, however. regular system of scrutinizing their budgets and programme of work and also regulating the payment of their staff has been brought into action and all the budgets and programmes of these Associations have been approved by the Divisional Board of Agriculture, before they are placed in the General Body meetings of these Associations.

Most of these Associations are doing very useful work and have undertaken the supply of pure seed on a large scale on exchange system, hire of implements, multiplication of seeds of pure strains of rice, wheat, Mohol jowar, Kopergaon varieties of groundnut, etc. They are now concentrating more attention on the demonstration of standing crops and some of these have arranged Agricultural Shows. All the Associations have now engaged trained fieldmen and are now requesting to have a regular cadre of these fieldmen ; so that in times of necessity they can be transferred from one Association to the other.

The District Local Board, Satara, has contributed a grant of Rs. 400 to each Association, and the scheme organized for the last 10 years has been continued during the year under report.

The Village Improvement Committees of Poona, Ahmednagar, Sholapur and Satara Districts have also contributed small amounts to all the Taluka Development Associations and this was a substantial help, especially to the newly started Associations. The Revenue Officers, such as the Collectors, Prant Officers and Mamlatdars, took keen interest in the working of these Associations and several shows and demonstrations, arranged by these Associations were presided over by these officers.

(2) *Non-credit Societies.*—There was much improvement in the working of all the non-credit societies on account of the favourable season. The following is the summary of work done by each Society :—

Serial No.	Name of the Society.	Number of ploughs, implements or machinery stocked.	Hire collected.	Number of Members.	Share capital.
			Rs. a. p.		Rs.
1	Shevgaon Agricultural Requisite Society.	346	3,417 1 6	85	4,885
2	Pathardi Agricultural Requisite Society.	228	2,656 12 6	94	2,148
3	Jamkhed Implement Society.	78	362 6 6	36	1,500
4	Malsiras Agricultural Requisite Society.	83	498 12 6	33	2,460
5	Sanvatsar Co-operative Agricultural Machinery and Implement Society.	28 B.H.P. Engine with Manlove crusher.	2,857 8 0	11	3,030
6	Saswad Mali Co-operative Purchase and Sale Society at Kopergaon and Belapur.	....	1,191 3 1	86	5,820
7*	Nira Canal Co-operative Purchase and Sale Union, Baramati.	3 Kamal crushers.	299 6 0	20	28,200
8	Satral Co-operative Seed and Implement Society.	12	51 15 0	28	235
9	Rahuri Taluka Co-operative Fruit Sale Society.	....	Total business done was worth Rs. 1,35,265 and commission earned is Rs. 7,099 out of Rs. 2,732 are returned to the members.	69	960
10	Mundhawa Crushing Society.	One complete set of Power crusher.	5,400 which are all spent for the expenses and the Society has not made any profit this year.	18	3,500

*This Union has sold cultivators' produce worth Rs. 2,98,450 and purchased their requirements worth Rs. 9,742.

Regulated Cotton Market at Baramati.—This market continued its activities on a bigger scale and has sold 8,710 carts of kapas and 309 carts of lint. The total commission and miscellaneous receipts collected during the year were Rs. 2,354 and the total expenses of Establishment and other charges were Rs. 1,047. Thus, a net profit of Rs. 1,307 was made by this cotton market. If the last year's balance of Rs. 1,707 be added to this profit, the net balance of this market is Rs. 3,014.

Section V.

Agricultural Services.

Land Development.—During the year under report, the work of land development was carried on more vigorously, as the Bunding Officer was assisted by three Sub-Overseers for Poona, Ahmednagar and Sholapur Districts, maintained from the funds of the Village Improvement Committees. The following statement shows the number of applications received and their disposal :—

(1) Applications for Tagai loan for land development

Serial No.	Name of District.	Number of applications							
		Received.				Disposed off.			
		Balance from last year.	During the year 1937-38.	Total number.	Amount	Number.	Amount	Balance for next year.	
								Number.	Amount.
					Rs.		Rs.		Rs.
1	Poona ..	1	13	14	10,475	3	5,800	10	4,675
		Rs. 5,000	Rs. 5,475						
2	Sholapur ..	9	32	41	14,625	23	7,700	18	6,925
		Rs. 2,400	Rs. 12,225						
3	Satara ..	..	1	1	500	1	500	..	..
			Rs. 500						
4	Nagar ..	1	40	41	10,200	14	3,475	27	6,725
		Rs. 300	Rs. 9,900						
		11	86	97	38,800	41	86,775	55	18,325
		Rs. 7,700	Rs. 28,100						

Remarks.—Many of these were received during the latter half of the year.

(2) Disposal of applications from private individuals.

Serial No.	Name of District.	Number of Applications				
		Received.			Disposed off.	
		Balance from last year.	During the year 1937-38.	Total.	During the year 1937-38.	Balance for next year.
1	Poona ..	13	64	77	23	54
2	Sholapur ..	30	18	48	17	31
3	Ahmednagar ..	49	101	150	39	111
4	Satara ..	3	8	11	2	9

(3) The statement of the schemes actually surveyed and constructed.

Serial No.	Name of District.	Number of land development schemes.				
		Prepared with their plans and Estimates.	Approximate area covered in acres.	Estimated cost for the improvement.	Schemes actually constructed or executed.	Approximate area covered in acres.
				Rs.		
1	Poona District ..	18	456	13,000	6	197
2	Sholapur District ..	31	832	22,600	6	217
3	Ahmednagar District	31	625	13,500	5	110
4	Satara District ..	3	45	1,500	2	30
	Total ..	83	1,958	50,600	19	554

Approximate actual cost of construction.

Rs.
4,700
5,900
2,500
950
14,050

Thus, it will be seen that 83 schemes costing Rs. 50,600 and covering an area of 1,958 acres were actually prepared and out of these 19 schemes

costing Rs. 14,050 and covering an area of 554 acres were actually executed.

Bunding Classes.—It is most gratifying to note that the present Government have been very kind to pay special attention to the problem of soil erosion and have granted Rs. 12,000 for holding Bunding Classes in this division. Accordingly, 4 Bunding classes were arranged to train the agriculturists, in the practical scientific methods of Bunding at Government cost. The details of these classes are given below :—

Serial No.	Place where the class was held.	District.	Duration.	Number of cultivators attending the class.
			Days.	
1	Talegaon Dhamdhere ..	Poona	15	103
2	Vaduj	Satara	15	77
3	Ahmednagar	Nagar	15	96
4	Pandharpur	Sholapur	11	102

The arrangement of boarding and lodging of all these students was made at Government cost and two special instructors and eight foremen were engaged to train these students in practical bunding.

The students were divided in the batches of 10 to 12 and were entrusted with the actual work of bunding. A test examination of the knowledge of students was taken by Prof. Trivedi, Professor of Agricultural Engineering, Physics and Mathematics, College of Agriculture, Poona, and he was thoroughly satisfied with the training of these students. Most of these classes were visited by the Director of Agriculture and the Ahmednagar Bunding Class was visited by the Honourable Minister for Revenue and Agriculture. The closing ceremony of this class was also performed by him.

The special features of these Bunding classes will be seen in the construction of the four Model Bunding Schemes at prominent places by the students of the Bunding Classes. All these schemes are designed on contour line basis and they will serve good demonstrations to the surrounding cultivators. The details of the schemes executed by the students are given below :—

Serial No.	Name of the scheme.	District.	Total length of bunds executed.	Approximate area covered in acres.
			Feet.	Acres.
1	Model Bunding Scheme at Talegaon Dhamdhere.	Poona	4,000	27
2	Model Bunding Scheme at Vaduj	Satara	2,200	15
3	Model Bunding Scheme at Ahmednagar.	Nagar	1,470	12
4	Model Bunding Scheme at Pandharpur.	Sholapur ..	2,182	10

The Bunding Officer also constructed land development Models at the following shows and demonstrations and delivered lectures on the necessity of land development :—

(1) Agricultural Show at Akola, District Ahmednagar.
(2) Swadeshi Industrial Exhibition at Sholapur.
(3) Agricultural Show at Parner, District Ahmednagar.
(4) Agricultural Show at Miri, District Ahmednagar.
(5) Agricultural Show at Shevgaon, District Ahmednagar.
(6) Agricultural Demonstration held at Mulegaon in Sholapur District.

Section VI.

Miscellaneous.

(1) *Co-ordination with the officers of other Departments.*—During the year under report, three co-ordination meetings of the officers of the various departments were held at Satara, Poona and Ratnagiri. The Collectors of Ahmednagar and Sholapur also discussed the Agricultural matters with the Deputy Director of Agriculture, whenever he happened to visit these places. The officers of the Irrigation and Co-operative Departments were also very sympathetic and good many problems were solved with their co-operation. During the year under report, the Honourable Minister for Revenue and Agriculture visited Ratnagiri in the month of November, 1937, and discussed all the possibilities of the agricultural improvements of this district. He also visited the Bunding class at Ahmednagar and gave the students the benefit of his advice. Further he visited Lakh and Belapur on the 29th of June, 1938, to see the damage done by grass-hoppers to the sugarcane crop and attended a mass meeting of the cultivators to discuss the possibilities of control measures on grass-hoppers.

(2) *Divisional Board of Agriculture.*—The Deputy Director was the Chairman of the Deccan Divisional Board of Agriculture, from 1st November 1937. This Board now consists of seven new non-official members, who are selected for the first time to this Board. Two meetings of the Deccan Divisional Board were held at Poona in the month of February 1938, and at Ratnagiri on the 16th of May 1938. As the number of the Taluka Development Associations is greatly increased, the work of the Chairman of the Deccan Divisional Board is also very much increased. The Board is trying to exercise effective control over the Budget and Programme of work of these Associations.

(3) *Cases of corruption.*—During the year, a careful watch was kept on the work of the staff and no cases of corruption were detected.

V. V. GADGIL,
Deputy Director of Agriculture,
South Central Division, Poona.

Poona, 3rd/5th August 1938.

Programme of Work for the year 1938-39 in South Central Division.

RESEARCH.

Kopergaon Farm.

(1) Confirmation of the results of the Padegaon Sugarcane Research Station, which has been recently laid on this Farm.

(2) Propagation of new promising varieties of Sugarcane, released from Padegaon.

(3) To continue the Banilla Cotton Scheme, financed by the Indian Central Cotton Committee, Bombay.

(4) Trial of jowar varieties of the Mohol Farm, including green manuring.

Mohol Farm.

(1) The breeding of jowar will be continued, with special attention to the purification of the selected promising strains from the mixed Maldandi Strains Nos. 47–3 and 35–1.

(2) Selection of Dagdi type of jowar will be continued.

Ratnagiri Farm.

(1) Multiplication of improved rice strains.

(2) Comparison of the new cross No. 4–7 with Patni No. 6 and Kolamba No. 79.

(3) The supply of " Kew " Pine-apple suckers in the district.

(4) To carry on the nursery for mango grafts, guava, chikoo, etc.

(5) Multiplication of improved nagli strains.

PROPAGANDA.

(1) All the work mentioned in the last year's report will be continued.

(2) New sugarcane varieties, viz. Co. 419 and Co. 413 will be tried and extended on a large scale.

(3) To arrange the trials of water-*cum*-manure experiments in the area of the three sugar factories in co-operation with the Research staff at Padegaon.

(4) Trial of growing sugarcane in Chopan soils in factory areas.

(5) Trial of Banilla, Jarilla and B.D. 8 Cotton.

(6) Distribution of pure seed through the Taluka Development Associations and Co-operative Societies.

(7) Extension of groundnut varieties of K. 1 and K. 3.

(8) To undertake the anti-smut propaganda on jowar, control measures on grass-hoppers on sugarcane and dusting of peas and mangoes for Mildew.

(9) Extension of dry farming propaganda on a large scale.

(10) Holding of Shows and Demonstrations.

(11) To organize Taluka Demonstration Centres in all the districts of South Central Division.

(12) Helping the village uplift work.

(13) To undertake the bunding schemes after the survey of the lands of the cultivators.

(14) Holding of bunding classes.

(15) To organize gun clubs for arranging shikar parties.

V. V. GADGIL,
Deputy Director of Agriculture,
South Central Division, Poona.

Poona, 3rd/5th August 1938.

MAP SHOWING
THE ACTIVITIES AND CROPS
OF THE SOUTH CENTRAL DIVISION.
1937-38.

G.P.I.O. POONA, 1939.

APPENDIX E.

Summary of Work done under the Deputy Director of Agriculture, Southern Division, for the year 1937–38.

Staff.

(1) I held charge of the office of the Deputy Director of Agriculture, Southern Division, Dharwar, throughout the year. Rao Saheb G. L. Kottur, Cotton Breeder, S. M. C., Dharwar, was on leave for one month from 1st September 1937. Mr. V. C. Pavate held charge of the office of the Cotton Superintendent, S. M. C., Dharwar, throughout the year. To help the Deputy Director of Agriculture in organising the Karnatak Agricultural Show at Belgaum, a temporary post of the Assistant to the Deputy Director of Agriculture, Southern Division, was created for five months in the Provincial cadre from 1st September 1937 and Mr. V. S. Kulkarni, Agricultural Overseer, Dharwar, was appointed to it. Mr. M. K. Desai, Agricultural Overseer, under the Cotton Breeder, S. M. C., Dharwar, was appointed as Assistant Plant Pathologist for the Koleroga investigation work at Sirsi. In the subordinate service there were many changes during the year under report. Mr. T. R. Khadilkar, Rice Breeder, Mugad, was deputed to the Jalgaon Cotton Breeding Scheme financed by the Indian Central Cotton Committee, and Mr. S. G. Kelkar, Superintendent, Gokak Farm, was appointed as Rice Breeder, Mugad, in his place. The post of the Bunding Officer was revived during the year, and Mr. S. G. Kadkol, Superintendent, Dharwar Farm, was appointed to it from 17th June 1938, with his Head Quarters at Bijapur. Mr. A. R. Neginhal, Superintendent, Agricultural College Farm, Poona, was transferred to this Division and posted as Superintendent, Dharwar Farm, from 16th June 1938. Mr. H. B. Kulkarni, District Agricultural Overseer, Dharwar, was transferred from this Division and appointed as Superintendent, Agricultural College Farm, Poona. Mr. G. R. Yadav, District Agricultural Overseer, Chikodi, was appointed as District Agricultural Overseer, Dharwar, and Mr. B. H. Ghatikar, Superintendent, Gokak Farm, was appointed as District Agricultural Overseer, Chikodi. Mr. V. S. Kulkarni, Agricultural Overseer, Dharwar, was appointed as Superintendent, Gokak Farm. The temporary post of the Shikar Officer was abolished during the year and Mr. S. S. Bhat, Assistant Shikar Officer, Dharwar, was appointed as Agricultural Overseer, Dharwar. In the reorganisation of District Work, Mr. P. G. Bidari, Agricultural Overseer, on Kumta Farm was taken away and placed as District Agricultural Overseer, Karwar.

Messrs. H. B. Kulkarni and V. S. Kulkarni were on leave on medical certificate for 3 months and 25 days and 25 days respectively. Mr. U. B. Joshi, Head Clerk of the office of the Deputy Director of Agriculture, Southern Division, has been on long leave on medical

certificate from 9th February 1938 and Mr. N. M. Handigol who was on deputation to the Indian Central Cotton Committee has been taken back and is acting in that place.

Season.

(2) The antemonsoon rains were adequate in most places of the Division; and the early monsoon rains were good in Kanara, fair in Malnad and Gadinad, but were very deficient in the eastern dry tract. Most of the kharif crops could not be sown in time, and those that were sown, suffered from a long continuous break in August and September. October rains helped these kharif crops to a certain extent; but normal yields could not be obtained. They suffered most in the eastern dry tract especially in the Bijapur District. The rabi crops did fairly well in the transition tract, but did poor in the eastern dry tract. Rice grew well in Kanara District, and gave yields approximating to normal. In Malnad the sowing was late in certain parts and the crop suffered from want of rains in many places. The yields ranged from 40 to 70 per cent. normal. Kharif jowar in the transition tract suffered from want of rains in August and September and the yields ranged from 50 to 70 per cent. normal. In the eastern dry tract it could be sown only in a few places. It suffered heavily for want of rains, and gave as poor yields as 20 to 40 per cent. normal. Cotton sowing was very late in many places and the crop suffered to a considerable extent due to insufficient moisture and the easterly dry winds in January and February. On the whole, the yields ranged from 30 to 70 per cent. normal. Groundnut was sown in time in Gadinad, but could not be sown at all in many places of the eastern dry tract. The crop suffered very much from want of rains and the yields ranged from 40 to 60 per cent. normal in the Gadinad and only from 20 to 40 per cent. normal in the dry tract. Bajri in Bijapur District practically failed. Pulses shared fate with kharif jowar. Wheat did fairly well except in Bijapur District. Rabi jowar was poor in most places and yields ranged from 30 to 60 per cent. normal. The Agricultural Season on the whole, was far from satisfactory. There was scarcity of fodder especially in the Bijapur District. Due to these low yields and the fall in prices of agricultural produce the economic position of the cultivator has gone from bad to worse. Scarcity works had to be undertaken in the Bijapur District.

(3) The work done during the year is summarised under the same heads as it was done in previous years to facilitate references: (*a*) Research and Experiments, (*b*) Propaganda, (*c*) Organisation, (*d*) Services to the Public, (*e*) Agricultural Education, and (*f*) General.

(*a*) Research and Experiments.

(4) *Dharwar Farm.*—Plant breeding work on cotton which is the main money crop of the Division continued to receive major attention. Jayavant cotton was compared as usual for yield in six replicated plots

with Farm Kumta. There was no difference in the yield of seed cotton. Jayavant, with its higher ginning and better staple fetched more value to the cultivators.

(5) One strain of Jayavant × 15 cross, styled as New Jayavant (St. No. 11-0-1-4-5) was compared with Jayavant according to Fisher's method. The yields and staple of both these cottons were observed to be just the same. The staple length in both cottons was the same, viz. 0·91 inches; but the ginning percentage of new Jayavant was far higher than Jayavant, viz. 32·4 against 28·3 which is a decided advantage. Another strain of Jayavant × 15 cross has been found to be earlier than New Jayavant, and it will be maintained for trials in places where early cotton is required.

(6) *Behaviour of wilt resistant cottons.*—A number of wilt resistant cottons were tested for their reaction in the artificially infected plot specially maintained for the purpose. Dharwar 1 suffered 25·5 per cent. The deaths in wilt resistant cottons varied from nil to 2·7 per cent. Jayavant suffered 2·1 per cent. Hagari from Bellary, which is coming in Bagalkot area was again tested for wilt resistance and was found to suffer as heavily as 61 per cent. Testing of this cotton will be discontinued.

Three cottons, viz. M. D. T. 2-1-1, K. F. T. 12 and K. F. T. 14, resist wilt hundred per cent. in the Green House as well as in the field. Selections of M. D. T. 2, K. F. T. 12 and K. F. T. 14 were tested in the Green House and all showed mottling on the cotyledons, though faint. The seed of six strains out of the eleven that were reported last year, which allowed the penetration of the fungus under the rigorous conditions of the Green House, as obtained at Dharwar, was sent to the Plant Pathologist, Poona, for testing the resistance under the Glass House conditions. All cultures except K. F. T. 12–1–11 stood the test extremely well under condition of optimum infection there, but mottling was common on cotyledons.

(7) *Selfed seed.*—Selfing was done as usual on Jayawant cotton at Dharwar and on Gadag No. 1 cotton at Gadag. Three hundred and sixty lbs. of Jayawant and 423 lbs. of Gadag No. 1 selfed seed have been obtained.

(8) *American cotton work.*—Three strains of the cross Gadag No. 1 × Cambodia were compared with Gagad No. 1 and Dharwar-American, both at Dharwar and Gadag, and all seem promising. They will be multiplied at Dharwar and tried at Gadag during the next season.

(9) *Spinning tests.*—Nine cottons were sent to the Director of Technological Laboratory, Bombay, for spinning tests. Jayawant × 15 No. 11-0-1-4 gave as good results as those of last year. Other numbers of the cross, though equally long in staple, fared inferior to Jayawant in other respects.

(10) *Seed tests.*—Ninety-five samples of Jayawant and Gadag No. 1 seed received from the Cotton staff were tested for germination. The percentage of germination varied from 70 to 95. The percentage of impurity was high only in one case.

(11) *Russian cottons.*—The 12 plants of Russian cotton, referred to in the last year's report, were tried for the second time, and were found to be very late. The ginning percentage and the staple were also found to be inferior. They are, therefore, not likely to be of use. Only two selections, however, one bearing red bolls and the other khaki ones, are of some interest and they will be continued.

(12) *Jowar.*—The selected strains of Fulgar White, Fulgar Yellow, Nandyal, Bilichigan, Muddinandyal and Chowri were maintained pure and the seed was distributed to the cultivators from Dharwar Farm. The total quantity of seed distributed was 4,891 lbs.

(13) *Groundnut.*—Improved Spanish 5-1 was compared with Spanish 5 in replicated plots again this year, and it gave higher yield of 1,568 lbs. per acre against 1,396 lbs. of Spanish 5. The increase in yield which is 12·3 per cent. is significant though the yields per acre are far below than those of last year. Pondicherry No. 8 was maintained pure and 2,421 lbs. of seed were produced on the Farm and were distributed in the district especially in Mundargi Petha of the Dharwar District.

(14) *Gram.*—The wilt resistant strain No. 18 was tried on a wilty patch in replicated plots. The percentage of wilted plants was only 2·2 against 95 of local. The yield of strain No. 18 was 395 lbs. per acre, while the local gram gave practically no yield, as it suffered very badly.

(15) *Other experiments on Dharwar Farm.*—Five varieties of cotton, viz. Dharwar No. 1, Dharwar No. 2, Jayawant, Kumta and Dharwar No. 1 × Rosea, were compared according to Fisher's method in 5 replications. This year, Dharwar No. 2 stood first (800 lbs.) in point of yield and Jayawant 2nd (767 lbs). per acre. But calculating from money point of view, Jayawant stood first. Five varieties of wheat, viz. Local Red, Bansi 808, Bansi 103, Pusa 3 and Pusa 114 were compared in 5 replications. Bansi 808 gave the highest yield of grain (389 lbs.) and chaff 680 lbs. per acre. It escapes rust and its cultivation is spreading in the district. Three varieties of gram, viz. Local, Burma and wilt resistant strain No. 18 were compared in 5 replications. Strain No. 18 gave the highest yield of 619 lbs. of grain and 108 lbs. of chaff per acre. Five varieties of tobacco, viz. Nipani, Nadiad No. 6, Adcock, Harrison Special and Anikivi were compared in five replications. Adcock gave highest yield of 616 lbs. of dry leaf per acre. Nipani stood next. Three varieties of Castor, viz. Local, Gujarat strain No. 5 and Haveri were compared in 5 replications. Local stood best. Three varieties of Groundnut, viz. Spanish peanut No. 5, Improved Spanish peanut, and Valentia were compared in 5 replications. Valentia gave the highest yield of 1,244 lbs. pods per acre against 1,124 lbs. pods per acre of improved Spanish peanut. Jayawant × 15 cotton was compared with Jayawant in 10 replications according to Student's method. Jayawant × 15 gave 587 lbs. seed cotton equal to 188 lbs. lint per acre against 620 lbs. seed cotton or 173 lbs. lint per acre of Jayawant. Three

varieties of chillies, viz. Local, Dabb-kai and Deccan were compared in 5 replications according to Fisher's method. Deccan gave the highest yield of 983 lbs. per acre while Local stood next. Deccan is significant over both Local and Dabb-kai. It seems promising and further trials will be taken.

(16) *Manurial experiments.*—In the Farm Yard Manure experiment, 15 tons Farm yard manure once in two years has produced highest yield of jowar and also the highest net profits this year. The effects of San green manuring on the succeeding crop of gram are not encouraging. Results on the rotational crops of jowar, however, will throw light over the experiment during the next season.

(17) *Rotational and cultural experiments.*—In the two year rotation experiments, jowar-tobacco series has produced better results than others this year. Taking all the results of previous years together, however, jowar followed by groundnut and gram has given the best results. In the seed rate experiment on groundnut, 100 lbs. seed per acre has given best results. Cotton and groundnut in alternate rows followed by jowar was found again to be more paying than cotton and groundnut in blocks followed by jowar. The results of experiments on groundnut with and without a second crop indicate that it is advantageous to take a crop of gram after groundnut and then rotate it with jowar. Unsieved jowar seed gave better results than the sieved seed.

(18) *Garden crops.*—Mango trees bore fairly well during the year. The value of produce per acre was Rs. 84–0–4 and cost of cultivation was Rs. 28–9–4, leaving a net profit of Rs. 55–7–0 per acre. The number of mango grafts prepared and sold during the year was 391 and the value realised was Rs. 488–12–0. Different varieties of French Beans were tried. Red Valentine gave the highest yield, viz. 640 lbs. per acre. Improved golden wax was observed to possess better flavour than others.

(19) *Poultry.*—Poultry on Dharwar Farm has been progressing satisfactorily and is attracting the attention of the public. A greater portion of the feeding stuff was continued to be grown on the Farm. The total value of the food was Rs. 115 or Re. 0–2–1 per bird per month. The total sale proceeds amounted to Rs. 158. The number of birds distributed was 60.

(20) *Gokak Farm.*—Sugarcane continued to receive major attention on this irrigated farm. The average yield of gul per acre for the whole of the farm was 8,358 lbs. against 8,710 lbs. of last year. The reduction in yield was largely due to the very low outturn of gul obtained from a plot of ratoon crop. The prices of gul were very low during the year under report and no profits could be realised, though the yields were fairly high. The other paying crops of this farm continued to be maize and cotton, maize and tur, cotton and groundnut and Cambodia

cotton. The following useful experiments were conducted on this farm :—

J 213 was compared with H.M. 544 in karl soil according to Student's method in 10 replications and it gave significantly higher yield in confirmation of the last three years' results. J 213 cane gave more profits with 20 and 30 cartloads. Seventy-five lbs. N. top-dressing to J 213 gave more net profits than 150 lbs. N. The results are in agreement of the past. In confirmation with the results of the last 4 years, Cambodia cotton 3 feet apart with one row of groundnut in the middle gave better results than four feet apart, with two rows of groundnut in the middle. Selection work in maize for yield and earliness and that in tur for wilt resistance continued and a few strains are found very promising. The pure strains are being multiplied on the farm for seed purpose. Selection work in chillies for Murda resistance was continued. Strain No. 1—1— gave 91 per cent. resistance. Seed from individual strains has been collected for further tests. Research work on the keeping quality of Mallad gul was continued. Climatic conditions of different tracts seem to have more influence than other factors.

(21) *Nursery and Orchard.*—The nursery and orchard on the Gokak Farm continued to be a paying concern. The total receipts were Rs. 1,523 and the expenditure including the overhead charges was Rs. 1,354, leaving a net profit of Rs. 169. The demand for lemon seedlings and Santra, Mosambi, Italian lemon and seedless guava grafts is increasing and the nursery on the Gokak Farm is successfully meeting it. Banana plantation completed its 9th year and a net profit of Rs. 110 per acre was realised against Rs. 125 of last year. The new pomegranate plantation yielded 7,127 fruits per acre against 12,763 of last year. The total per acre income was Rs. 130 and the total expenditure was Rs. 137 leaving a net loss of Rs. 7 against a net profit of Rs. 220 of last year.

(22) *Mugad Rice Breeding Station.*—Four promising strains of Mugad, viz. early 161, inter 81, and 249, and late 141, and 3 strains of Antersal, viz. early 67, inter 90, and late 200, which gave significantly higher yields than local were maintained pure and multiplied on Mugad farm. 2,720 lbs. of seed of Mugad strains sufficient for 34 acres and 1,640 lbs. of Antersal strains sufficient for 20½ acres were produced for further multiplication in cultivators' fields. Twenty-four strains of Mugad and 28 strains of Antersal have been kept in reserve. Selection in Dodgya variety of paddy was continued. Seven promising strains of this variety were compared for yield with local and Belgaum checks according to Fisher's method in five replications. Only three out of seven strains fared better than local and Belgaum checks. The trials will be repeated. Five Indian rices referred to in paragraph (22) of last year's report were compared again with Mugad 141 and Sanna-bhatta. Luchai was again observed to be a promising fine early variety. The trials will be repeated. Selections in local fine varieties continued. The inheritance of grain shedding in the cross between Mugad 81 and Gonag was studied in F 4 generation. The study of this was vitiated owing to late harvesting. The performance of the purple paddy was compared with that of M. 161

according to Student's method in 10 replications. The results were significantly in favour of M. 161.

(23) *Kumta Farm.*—Rice breeding continued to be the main work of this Farm. The early Muskaty strain 1315 was compared with the local varieties of the coastal talukas, viz. Ajaga and Bille-Akka. It was found to be yielding better than Ajaga in confirmation with the results of previous years, but the Bille-Akka variety gave higher yields than strain 1315. Further trials will be continued. Muskaty 1315 was compared with Muskaty 1012, which was maintained in the kept-on culture and both the strains gave equal yields this year. The trials will be continued during the next season. The mid-late Jeddu strain 1061 was compared with ordinary Jeddu and local variety and it was again found to be better yielding. Jeddu strain Nos. 80, 93 and 99 were again observed to be less yielding than Jeddu strain 1061. Red Halga strain No. 244 was again compared with local Halga and Mugin-Bendu and was found to be higher yielding. The increased yield of paddy was 24 per cent. over the local red Halga. The higher yield is largely due to the resistance of the strain to "Kane pest". Selection in Mugin-Bendu variety continued. Six strains have given increased yields of significant value over the check and the trials of those will be repeated. Six strains of up-ghat white Halga were compared according to Fisher's method and all these gave increased yield of significant value varying from 9 to 30 per cent. over the check. Trials of flood-resistant strains of kagga paddy were discontinued. The Halga 244 × Antersal 90 and Jeddu 1061 × Mugad 161 were studied in F3 generation.

(24) *Sugarcane and other crops.*—In the varietal experiment, H.M. 87 and H.M. 544 gave lower yields than others. During the year under report, Co. 402, 413, 414 and 421 were planted on row scale. Co. 421 was found to be the best from yield point of view. It has long internodes. This variety seems to be very promising. The manurial experiments on mangoes have given better result with salt than without salt. The cultivation of cocoanut as a dry crop was continued. The growth of the trees is very satisfactory. The yields of bearing trees are being recorded. Pine apple plantation (Kew variety) was extended by 9 gunthas to provide more suckers for the district. The total area is now 38 gunthas. The manurial experiments reported last year were continued and the results are being watched. A few plants are producing fruits. Experiments to induce more suckers (*a*) by cutting away the crown just at the flowering stage and (*b*) by stirring the soil to irritate the roots to develop the suckers are in progress. No conclusions have been arrived at. Six new varieties of pine apple planted last year for testing the yielding capacity have been continued. During the year under report 4,500 suckers of Kew and Queen varieties were distributed from the nursery on the Kumta Farm. This nursery also supplied 720 mango grafts and 500 other fruit seedlings to the cultivators. Its extension and development is still under consideration. Soya bean again failed on this Farm. Italian lemon plants continued to thrive well. This fruit tree seems to have good scope in Kanara District.

(25) *Gadag Seed Farm.*—The field of the cultivator referred to in paragraph (25) of the last year's report was again continued to be treated as seed farm. 423 lbs. of Gadag No. 1 seed has been selfed and 7,500 lbs. seed in the 2nd stage has been raised on this Farm during the year. The owner of the field continued to help the Department in all possible ways and deserves thanks. The cultivation was of high order.

(26) *Tegur Cattle Breeding Farm.*—The cross between local cows and Amrit Mahal bull continued to show good progress. During the year under report, 14 bull calves and 12 cow calves were born, and almost all of them resemble Amrit Mahal. The total number of herd on 31st March 1938 was 141 against 133 of last year. 3 bull calves and one cow calf and 5 old cows were sold during the year. The bull calves sold in previous years for draft purpose have attracted the attention of the cultivators of the villages round the farm. Hay and silage were prepared on the farm as usual and jowar and kulthi were grown for the combined object of fodder and grain. The lucerne was also grown on a small scale under well irrigation. The expenditure per head of cattle was Rs. 16 against Rs. 17 of last year.

(27) *Experiments in cultivators' fields.*—The District staff continued to conduct experiments in cultivators' fields as usual. Jayawant cotton was compared with local Kumta in 55 plots all over the division in different kinds of soils. The average yield of Jayawant cotton from these experiments calculated in lint was higher than that of local Kumta, though the difference was not great. Gadag No. 1 cotton was similarly compared with Dharwar-American in 8 places in Gadag and Ron talukas of the Dharwar District. In both these centres the results were decidedly in favour of Gadag No. 1. Cambodia cotton (Co. 2) was compared with Upland under canal and well irrigation at 4 places. Cambodia (Co. 2) gave on an average 906 lbs. of kapas per acre against 876 of Upland. Cambodia cotton is gaining ground in the irrigated tract. A strain of Dharwar 1 × Dharwar 2 cross (early Jayawant) was compared with local Kumta and Jayawant cottons all over the division in 10 places. Early Jayawant did slightly better than the other two. The experiment needs repetition. The trials of selected strains of rabi jowar were conducted in 5 places, Maldandi strain No. 35-1 in 4 places, and B. D. 24 in one place. Maldandi fared better than local. The trial of B. D. 24 was spoiled due to insufficient rain after sowing. Selected strains of paddy were compared with local in all the important paddy growing centres of the division. The Mugad Farm selections gave on an average 10·5 per cent. higher yield. In the North Kanara district, the trials of Kumta Farm selections were discontinued during the year, as they have been giving consistently higher yield. Two more strains of Up-ghat Halga strain Nos. 1681 and 1690 were tried during the year and they have given 16 per cent. increased yield. The trial of Pivala Kathya strain No. 808 was continued in 14 places and it gave more yield than local in almost all cases. There was no rust attack during the year, but the yields were low due to want of rains in many places. Pondicherry strain No. 8 groundnut was tried in 4 places against the local.

Its average increased yield was 16 per cent. over the local. Spanish peanut strain No. 5 gave almost equal yield in three places where it was tried. J 213 variety of sugarcane was compared with local Pundia in 3 places. J 213 gave increased yield over Pundia in all places. Soya bean was compared with kharif crops in 5 places in different kind of soils and under different conditions of rainfall. It did better than Kulthi, but poorer than groundnut. Nadiad No. 6 tobacco was tried against Nipani in 2 places and it gave higher yield in both.

(*b*) Propaganda.

(28) *District Cotton Work.*—The work under the New Seed Multiplication Scheme referred to in paragraph 28 of last year's report was continued through Societies and agents. All centres worked well except Hubli which the Sale Society accepted to work. The reserved area under Jayawant cotton in 7 centres was 37,991 acres and that under Gadag No. 1 cotton in two centres was 19,858. The crop was rogued under careful supervision and the rogueing charges came to 4·4 pies in the case of Jayawant and 4·0 in the case of Gadag No. 1 cotton. The agents selected continued to do very good work. The quantity of Jayawant cotton seed stocked was 37,90,390 lbs. and that of Gadag No. 1 was 12,29,871 lbs. The season for cotton was unfavourable this year also and some seed remained unsold. The quantities actually distributed and the area covered were 27,35,090 lbs., 2,45,318 acres in the case of Jayawant and 9,25,814 lbs., 92,539 acres in the case of Gadag No. 1 cotton respectively.

(29) *Grading and auction sales.*—Grading and auction sales of Jayawant and Gadag No. 1 cottons were organised in all centres through the help of the agents as in the last year. The agents continued to work hard in pooling together the produce from the cultivators to whom they had supplied seed. They gave also advances to the deserving cultivators on their standing crop and worked very closely with the cotton staff in making these auction sales of improved cottons very successful. The Gadag Sale Society continued to sell its cotton mostly by holding auction sales, but Hubli, by private treaty. The total number of dokras sold by auction was 15,667 in the case of Jayawant and 15,587 in the case of Gadag No. 1 cotton. The extra prices realised in auction sales were about Rs. 10 per Naga of 1,344 lbs. seed cotton on an average. In these auction sales held during the year, 44,77,986 lbs. Jayawant and 14,52,679 lbs. Gadag No. 1 cotton seed have been purchased and stocked by the agents and Gadag Sale Society for distribution during the next season.

(30) (*a*) *Working of the Cotton Transport Act.*—20 check stations were opened during the year and the District Agricultural Overseers continued to supervise the work of the same. Licences were issued as usual from Gadag, Bagalkot and Nargund offices for import of good cotton from the bordering villages outside the protected areas. The

total quantity thus imported with the help of licences was 1,895 dokras and 96 carts seed cotton and 16,026 dokras of lint into the Kumta-Dharwar area and 310 dokras of seed cotton and 2,609 dokras of lint and 1,296 full pressed bales into the Bagalkot area. The Cotton Transport Act continued to work well in the interests of growers as well as consumers of cotton. Illicit import by rail was totally stopped, whereas that by road continued to a certain extent with all the arrangements made to improve the efficiency of check stations. Rules under the Cotton Transport Act require some amendments to empower the officers of the Agricultural Department to deal effectively with the illicit import of cotton by road and the need of a separate officer to work as a detective is again emphasised.

(30) (*b*) *Working of the Cotton Market Act.*—The Regulated cotton market at Bailhongal referred to in paragraph 30 (*b*) of the last year's report continued its work satisfactorily. The Deputy Director of Agriculture worked again as the Supervisor. The Cotton Superintendent was again elected as the Chairman of the Market Committee. During the year under report, 7 General Body meetings and 4 Controlling Committee meetings were held. Correct weighment of cotton and auction sales have become the rule. 46,368 dokras of kapas and 13 dokras of lint were sold in the Market Yard during the season under report, against 53,000 dokras of kapas and 2,200 dokras of lint of last year. The Regulated Cotton Market Act has been applied to Bijapur during the year and the by-laws have been framed. The actual work will start from the next season. Attempts are being made to apply the Act to Gadag, Nargund and Hubli Markets also.

(31) *General District Work.*—During the year under report, the grants for demonstrations continued to be very limited. The District Agricultural Overseers were instructed to conduct the demonstrations through the Taluka Development Associations and to utilise their limited funds of the Department in places where these Associations do not exist. Demonstrations of successful standing crops of selected strains of cotton, paddy, jowar, groundnut, wheat and sugarcane, in experimental plots, continued to receive major portion of the attention of the District Agricultural Overseers all over the Division. As many as 66 demonstrations of paddy strains were conducted. This extensive work could be achieved with the help of the Kamgars employed under Village Improvement Scheme sanctioned during the year. Village demonstrations on improved strains of cotton were almost equally extensive. Besides, various crop demonstrations, sulphur dusting propaganda against smut in jowar and mango hoppers, and spraying with Bordeaux mixture against Koleroga on betelnuts were continued to be done on an equally large scale. Spraying demonstrations against Koleroga were conducted in 101 villages where intensive work was undertaken. The demonstrations of improved method of gul-making were mostly limited to the Chikodi tract, where a combination of Poona furnace and Kamatnur Pan was used, and 20 new furnaces

were built during the year under report. The demonstrations of stone rollers and wheat threshers were mostly limited to the eastern part of Dharwar and Belgaum districts. The Agricultural Engineer's improved seed-drill was demonstrated round Dharwar and Gadag. In all 242 demonstrations of various nature were conducted during the year in the division and the progress of Departmental work through these village demonstrations continued to be quite satisfactory. The other important district works were multiplication and distribution of Pondicherry groundnut seed strain No. 8 and Pivala Kathya wheat seed strain No. 808. The seed raised on Dharwar Farm was multiplied on cultivators' fields and that grown by the seed growers went for general distribution. 14,000 lbs. of reliable Pondicherry groundnut seed and 22,200 lbs. of Pivala Kathya wheat seed strain No. 808 have thus been distributed during the year and natural spread also took place to a considerable extent. The cultivation of onion as a second crop after paddy, introduced by the Agricultural Department is gaining ground in Kanara district. The area covered by this crop was 600 acres during the year under report against 350 acres of last year. Onion seed was produced in cultivators' fields and distributed to others. Fruit culture is similarly extending in various parts of the division. Cattle improvement was also a part of general district work. 20 bulls were purchased and located in different places under the Viceroy's Gift Bull scheme during the year. This with 21 bulls located last year makes a total of 41.

(32) Fairly big agricultural and cattle shows held in the Division were—4 in Dharwar district, 2 in Bijapur district and 2 in Belgaum district. In addition to these, a large number of preliminary cattle shows were arranged in the division to select best cattle for the Karnatak Agricultural Show, Belgaum. Series of lectures were arranged along with these shows and demonstrations, on the subjects useful to the various tracts.

(33) The Rural Uplift work undertaken at Kakhandiki in the Bijapur district with the aid of the donation given by Mr. Shivappa Arli continued to be satisfactory. 1,175 acres of land were ploughed with iron ploughs against 3,020 acres of last year. More land could not be ploughed on account of sale of good number of bullocks due to fodder scarcity. 281 acres of land with Jayawant cotton and 238 acres with Maldandi strain No. 35-1 were sown even under famine conditions. The breeding bull newly purchased has given satisfactory services. The fieldman of this Samstha attended to various works including improvement of fruit gardens.

(34) *Propaganda against smut on jowar.*—The work was continued through the District Agricultural Overseers, the Revenue Officers and the Taluka Development Associations. The District Agricultural Overseers continued to hold a number of demonstrations and showed the method of treating jowar seed with sulphur dust against smut. In all, 1,388 packets of sulphur dust sufficient to treat the seed for 22,208 acres were distributed during the year.

(35) *Kanarese Agricultural magazine.*—The propaganda through the Kanarese Agricultural Magazine was continued and many interesting articles were contributed by the officers of the Agricultural Department on different useful subjects. The Deputy Director of Agriculture continued to be the Chairman of the Publication Committee and Mr. S. G. Kadkol, Superintendent, Dharwar Farm, as Editor of the Magazine. Articles on important demonstrations and Village Improvement work also appeared in the Magazine.

(*c*) Organisation.

(36) *Co-operative Sale Societies.*—The Hubli and Gadag Cotton Sale Societies continued to do their work on a fairly large scale. The Hubli Cotton Sale Society has now accepted the New Cotton Seed Multiplication Scheme. The Gadag Cotton Sale Society sold most of its cotton by auction sales, whereas the Hubli Cotton Sale Society, by private treaty. Dharwar, Bijapur and Bailhongal Cotton Sale Societies also continued to do their work but on a smaller scale. The prices realised in auction sales of improved cottons were always higher than those in the Market. Under the New Seed Multiplication Scheme sanctioned by the Indian Central Cotton Committee and the Government of Bombay, auction sales of improved cottons were encouraged in all cotton growing centres of the Division and they were very much appreciated by the cultivators. The Chilly Sale Union at Byadgi sold about 849 bundles of chillies.

(37) *Other Co-operative Societies.*—The Seed, Implement and Manure Societies are not doing any appreciable work. Cattle Breeding Societies are realising the benefits derived by crossing country cows with Amrit Mahal bull. Technical management is still lacking. Better guidance continues to be a need. Sidenur Cattle Breeding Society continued to do better work than others.

(38) *Destruction of prickly pear.*—The attack of Cochineal insect has now spread even to unapproachable places and the pear has altogether disappeared from most parts of the Southern Division.

(39) *Crop Protection Campaigns.*—The Gun Clubs organised for protection of crops against wild pigs fared well and continued to do good work. The Arwatgi, Kalkeri, Hulkop-Galgi and Varah gun-clubs were outstanding in their merits and killed 73, 97, 57 and 60 pigs respectively during the year. Three more gun-clubs were organised, which make up the total of 19. In all, 561 pigs were killed during the year and a good number was scared away. 85,000 acres of crops were protected by the operations of these gun-clubs, in the Southern division, and the cultivators were saved of a good deal of night watching. The work of these gun-clubs, therefore, is being very much appreciated and applications for starting more gun-clubs are pouring in. The campaigns against wild deer were continued at Kaujageri and were organised also in four other villages of Ron taluka. An area of nearly 18,500 acres was protected at an expense of Rs. 329. In all 107 deer were killed and a greater number was scared away.

(40) *Spraying Bordeaux mixture against Koleroga on betelnut.*—The scheme sanctioned by Government for Siddapur Taluka was operated intensively and an area of 2,008 acres was sprayed against 2,000 of last year. Loans issued to the cultivators for the purchase of sprayers and chemicals and to meet the wages of expert climbers amounted to Rs. 8,855 against Rs. 9,492 of last year, and Rs. 7,374 of 1935-36. The work continued in 101 villages. Similar work was done in other talukas of the Kanara District also, but on a less intensive scale ; and an area of 1,479 acres was sprayed specially in Honavar, Kumta, Sirsi and Yellapur Talukas. The total area operated, therefore, was 3,487 acres against 3,516 of last year. An attempt was made to inspect the crops sprayed and unsprayed in different parts of the district and yields were estimated. The benefits derived by the gardeners from spraying are calculated to amount to Rs. 1,50,000 at Rs. 43 per acre. There were good many difficulties in the way of work and propaganda was the only weapon available to overcome them. With all the difficulties, the progress achieved has been satisfactory.

(41) *Taluka Development Associations.*—There are 15 Taluka Development Associations in the Southern Division—7 in Dharwar, 4 in Belgaum, 2 in Bijapur and 2 in Kanara District. According to the classification made by the Divisional Board, 7 are in A class, 5 in B class and 1 in C class, against 6 in A class, 8 in B class and 1 in C class, last year. Classification of two Associations has not yet been adopted by the Board. The total amount of subsidy given to these Associations was Rs. 5,157 during the year against Rs. 5,469 of last year. The work of these Associations continued to be fairly good. One Association has gone up from B to A during the year. Many of these Associations worked usefully towards the spread of improved seeds of cotton, sulphur dust propaganda and fruit culture. The finances of many of these Associations continued to be unsound. Co-operative Credit Societies should come forth to help these associations and take more interest in their development.

(42) *Dharwar District Agricultural Association.*—The main work of this Association continues to be the publication of the Kanarese Agricultural Magazine and thereby to spread agricultural knowledge among the cultivators. The other activities of this Association are suffering and attempts are being made to induce the members to take more interest in the work of their Association.

(43) *Wilson Anti-Famine Institute.*—This Institute at Bijapur continues to do good work in various directions. The depôts organised by the Institute sold implements mainly iron ploughs and their spare parts worth Rs. 359 against Rs. 1,978 of last year. The fall was due to the very bad season. The Institute distributed 839 bags of Jayawant cotton seed against 500 of last year. Forty-one bags of 808 wheat seed and 63 bags of rabi jowar Maldandi strain 35-1 were distributed against 63 and 92 bags of last year respectively. Besides these, the Institute distributed sulphur dust worth Rs. 95 and supplied a breeding bull to

one village. The Central Poultry Farm distributed 889 table eggs and 249 setting eggs during the year. Besides, the Institute distributed vegetable seeds worth Rs. 205 and utilised the services of the Branch fieldmen in collection and distribution of fodder. On account of the prevailing famine conditions during the year the ordinary routine work of Rural Uplift had to be suspended.

(44) *The Divisional Board.*—The Divisional Board held its meetings as usual and guided the work of the Taluka Development Associations. The useful subjects discussed were—(*a*) Steps against the "Katte" disease of cardamum. (*b*) Multiplication of the improved strains of paddy. (*c*) Utility of bunds in dry tracts. (*d*) Improvement of the financial conditions of the Taluka Development Associations.

(*d*) Direct Services to the Public.

(45) *Field embankments.*—The special post of Bunding Officer has been recently restored. One Agricultural Overseer who was spared for bunding work also continued to prepare plans and estimates. In all 29 schemes were prepared during the year for 760 acres against 41 for 800 acres of last year. The total estimated cost of these was Rs. 13,300. Twenty-six schemes out of 29 required tagavi loans amounting to Rs. 11,300 and the rest were financed by the owners of lands themselves. In addition to the above, the Bunding Officer continued to do some intensive work at Marewad and the Bunding Association referred to in paragraph 45 of last year's report is doing good work. He also attended to the organisation of the Bunding Section of the Karnatak Agricultural Show, at Belgaum. Under the orders of Government, two training classes in bunding were organised, one at Torvi and the other at Bagalkot in the Bijapur District; and in all 181 cultivators were trained. It is hoped that these cultivators will spread their knowledge among others. It is proposed to conduct 4 more training classes, two in Dharwar and 2 in Belgaum Districts soon after rains.

(46) *Tractor ploughing.*—The assistance hitherto rendered by the Agricultural Department to the Karnatak Agricultural Transport Company for tractor ploughing with the aid of tagavi loans was not continued during the year. But Government, in their memorandum No. R.D. 5898-A/28, dated 3rd March 1938, ordered that an investigation into the cost of tractor ploughing operations should be carried out for 30 days with a view to arriving at a reasonable rate per acre at which the proposed tractor ploughing syndicate should undertake ploughing operations in the Southern Division. Mr. V. S. Kulkarni, District Agricultural Overseer, was accordingly deputed to collect full details by camping at the site of operations during the period of trial. A detailed report embodying all the factors affecting the cost of tractor ploughing has since been submitted and it is before Government for consideration.

(e) Agricultural Education.

(47) The Primary Agricultural School at Devi-Hosur completed its 24th year. 30 applications were received for admission against 35 of last year. The number of students in the 2nd year was 19 and 13 fresh students were admitted for the first year's class. Results of Annual Examinations continued to be satisfactory. 10 out of 13 in the first year and 17 out of 19 passed in the second year. The number of passed students of Devi-Hosur school came to 318. The Association of these passed students formed in the year 1935 held its third Annual General Body meeting at Devi-Hosur and discussed many important subjects. The Co-operative Credit Society, the Sale Union, a Library and the Reading Room organised by the students are serving useful purpose. The health of the students continued to be good and their practical work on the farm was satisfactory. The Social Gathering was very successful and many past students attended it. The staff and students of the School organised successfully the Rural Education Court at the Karnatak Agricultural Show, at Belgaum.

(48) Examinations of all the Agricultural Bias classes were continued to be conducted by the District staff of the Agricultural Department. The duty of occasional inspection of these schools was also done by the District staff. It is desirable that all the District Local Boards who run these schools should make arrangements for inspection of these schools and relieve the District staff of the Agricultural Department to do more of their own work. A School or College to train teachers of these Agricultural Bias classes continues to be a need.

(49) *Publications.*—A number of articles were contributed by the officers of the Agricultural Department in the Southern Division for publication in the Kanarese Agricultural Magazine, College Magazine, *Times of India* and Local newspapers.

General.

(50) The new Cotton Seed Multiplication Scheme referred to in paragraph 51 of the last year's report continued its operations. Under this scheme, pure Jayawant seed covered an area of 2½ lacs acres and Gadag No. 1, 92,539 acres. The natural spread was estimated at about 155,000 acres and 33,000 acres respectively, making a total of about 4 lacs acres under Jayawant and 1¼ lacs acres under Gadag No. 1. Pure Jayawant seed sufficient for 4½ lacs acres and Gadag No. 1 seed sufficient for 1½ lacs acres have been stocked for the next season. Besides these, the natural spread is likely to be more than that of the last year. A Horticultural Training class was organised at Arbhavi Farm in Belgaum district, which was attended by 30 students. Another was held on the Kumta Farm for North Kanara district with an attendance of 86 students.

(51) The schemes for Agricultural improvements through Village Improvement Funds, referred to last year, continued during the year. Improved paddy seed covered an area of 5,367 acres. J213 cane was made popular in Mallad and H.M. 544 in Kanara. 222,100 cane sets of J213 were distributed during the year. 172 improved manure pits were constructed. 20 Poona Furnaces were built in the Belgaum district. The temporary Bunding Officer appointed in the Belgaum district prepared 49 schemes and supervised the bunding operations. The Implement Depots which were established in 6 places last year continued to do their work. The Rural Uplift Van was equipped with all exhibits, charts and models of agricultural interest and the District staff demonstrated the same in 53 villages, according to the programmes prepared by the Collectors. All this was an additional work to the Deputy Director of Agriculture and his District staff.

(52) The Karnatak Agricultural Show, of which mention was made in the last year's report, was held at Belgaum from the 17th to 27th of January 1938. Though a Divisional one, it was organised on the same lines as those of the Presidency Shows of Poona and Ahmedabad, and comprised as many as 25 sections exhibiting various aspects of Agriculture, Live-stock, Co-operation, Rural Health, Rural Education, and Rural Industries. The neighbouring Southern Maratha Country States heartily co-operated, and organised their own State Stalls. The Karnatak Provincial Congress Committee also gave their valuable co-operation and organised the Khadi and Village Industries section which was very interesting and instructive. The Show was opened by His Excellency Sir Roger Lumley, Governor of Bombay, who was its President. The Honourable Mr. Morarji Desai, Minister for Revenue and Agriculture, Government of Bombay, and the Raja Saheb of Sangli, who were the Vice Presidents of the Show also attended. The Show attracted an enormous crowd of cultivators numbering about 150,000 from all parts of the Southern Division and the neighbouring States throughout the Show period. The Show depended for its finance upon the contribution from the Presidency Agricultural Show Fund and the contributions and donations from the public. The total receipts from all sources till the end of July 1938 amounted to Rs. 85,679 and the total payments for the same period came to Rs. 71,528 leaving a net balance of Rs. 14,150.

(53) Besides all the above routine and additional work, the Deputy Director of Agriculture attended Railway Board, Indian Central Cotton Committee, Forest Advisory Committee and District Village Improvement Committee meetings in various places. He worked for the application of Cotton Market Act at Bijapur, Gadag and Nargund.

(54) I accompanied the Parliamentary Secretary to the Honourable Minister for Agriculture and showed him the Tractor-ploughed fields. I gave evidence before the Irrigation Committee appointed by Government. His Excellency the Governor of Bombay visited the Wilson Anti-Famine Institute, at Bijapur. I accompanied the Director

of Agriculture, Bombay Province, Poona, on tour in the Southern Division, who inspected various agricultural institutions and also the Honourable Minister for Revenue, who toured in the most of the interior of North Kanara district and in some parts of Dharwar district.

(55) *Efforts made in regard to suppression of corruption.*—Agricultural Research, Education and Propaganda are all the activities of this Department, and none of these affords scope for corruption on the part of its servants. The Research Section has little or no contact with the public, while the Education and Propaganda sections have to depend upon the public co-operation and help for their very existence. Efforts are, however, made to impress upon all the officers and surbordinates the necessity of absolute purity and honesty in the discharge of their duties and the serious consequences of acting or attempting to act otherwise.

(56) The activities of the Agricultural Department in the Southern Division have much extended especially in the direction of the spread of improved varieties of cotton, paddy and sugarcane crops and organising gun-clubs against attack of wild pigs. The special schemes referred to in paragraph (51) and the Karnatak Agricultural Show work referred to in paragraph (52) have brought considerable additional work. The clerical staff in the office of the Deputy Director of Agriculture is required to be considerably increased. All the members of the staff worked well. Many Revenue Officers and private gentlemen continued to help our Agricultural Propaganda and organisation work and my thanks are due to them. My special thanks are due to the Collectors of all the four districts who gave me all the help needed.

S. S. SALIMATH,
Deputy Director of Agriculture,
Southern Division, Dharwar.

Programme of work under the Deputy Director of Agriculture, Southern Division, Dharwar, for 1938-39.

(a) Research and Experiments.

(1) *Cotton Breeding work.*—Selfing of Jayawant and Gadag No. 1 cottons will be continued for multiplication of seed required for 9 centres according to the New Scheme sanctioned by the Indian Central Cotton Committee and the Government. Different cottons will be tested for wilt resistance both in the field and the green house. Selection in important new crosses will continue. The New Jayawant x15 cross will be compared with Jayawant and Kumta and Gadag No. 1 xCo. 2 cross will be compared with Gadag No. 1 cotton for yield.

(2) *Jowar breeding work.*—Fulgar Yellow, Fulgar White, Nandyal, Bilichigan and Savaner strains of jowar will be maintained by selfing and grown on Dharwar Farm to meet the needs of the cultivators.

(3) *Groundnut breeding work.*—Spanish peanut variety of groundnut strain No. 5 and Pondicherry variety strain No. 8 will be grown on the farm to produce seed for distribution in the district. Selection in other promising varieties will be continued.

(4) *General Experiments on Dharwar Farm.*—All the important varietal manurial and rotational experiments will be continued on jowar, cotton wheat, tobacco and other dry crops. Sann green manuring experiment has been modified.

(5) *General Experiments on Gokak Farm.*—Under crop experiments, sugarcane, cotton and tobacco varieties will continue to be compared. Under Manurial experiments, different dozes of artificial manures on sugarcane will be repeated. Selection in maize and wilt resistant tur will be continued. Fruit gardening with its nursery will continue to receive increased attention.

(6) *Rice Breeding work.*—Selected strains of Mugad and Antarsal varieties of paddy will continue to be multiplied on Mugad farm. Selection in Dodgya variety of paddy will receive major attention. Selection in local fine rices will also be continued. On Kumta Farm, selected strains of Jeddu, Maskaty and Red Halga strains will continue to be multiplied. Selection in Up-ghat white Halga variety of paddy will be continued. Manurial experiments on paddy and sugarcane will be repeated and different varieties of sugarcane will be compared. The cultivation of cocoanut as dry crop will continue to receive attention. Pine-apple cultivation will be extended and methods of inducing more suckers to Kew variety will be tried.

(7) *Experiments in Cultivators' fields.*—Selected strains of cotton jowar, paddy, wheat, sugarcane and groundnut will be compared with local in different places of the division where required. Artificial manures will be tested on sugarcane, paddy and betelnut crops.

MAP SHOWING THE SPREAD OF IMPROVED COTTONS, JAYWANT AND GADAG No. 1, IN THE SOUTHERN DIVISION.

JAYWANT.

CENTRES	AREA COVERED
1 Hubli	100000 Acres
2 Haveri	75000 "
3 Navalgund	50000 "
4 Bailhongal	45000 "
5 Athani	45000 "
6 Bagalkot	35000 "
7 Bijapur	25000 "

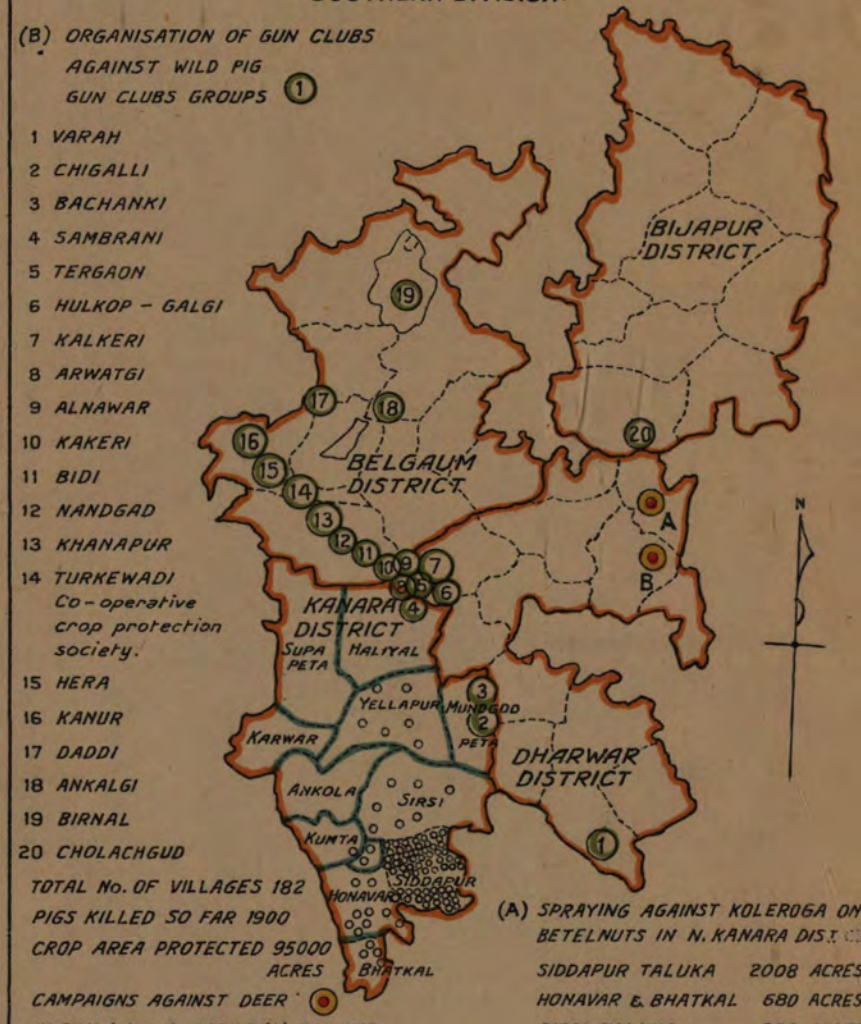
G. P. I. O. POONA 1939.

EXTENT OF IMPROVED VARIETIES OF GROUNDNUTS IN THE SOUTHERN DIVISION

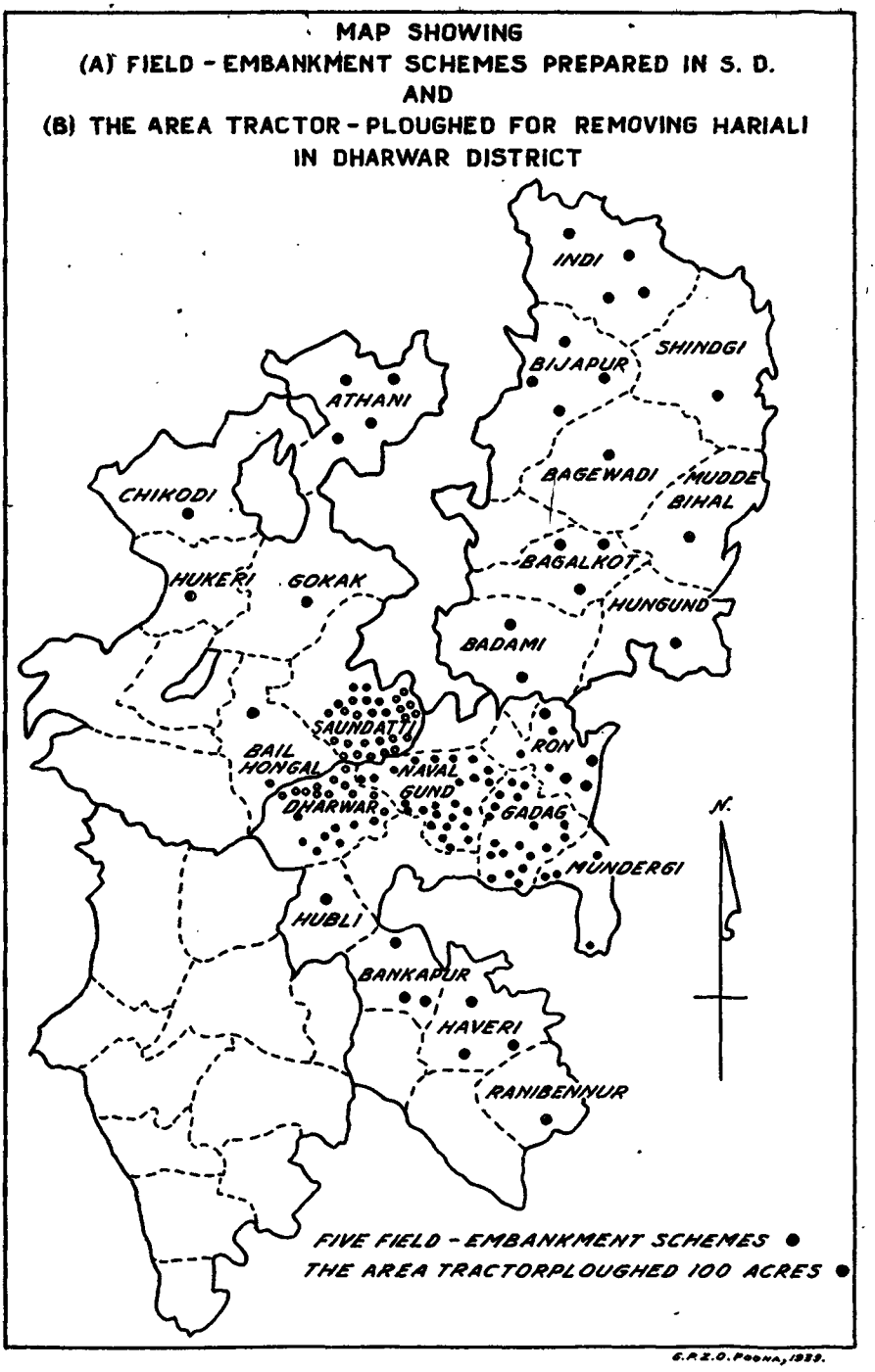
G.P.I.O. POONA, 1939.

EXTENT OF IMPROVED VARIETIES OF
PADDY AND SUGARCANE
IN THE SOUTHERN DIVISION.
Paddy area 1 Dot = 100 acres
Sugarcane area
J 213 & H.M. 544
1 Bar 100 acres
BIJAPUR
DISTRICT
NANDGAD
BELGAUM
KHANAPUR
DHARWAR
SUPA
HALIYAL
KALGHATGI
SHIGGAON
YELLAPUR
MUNDGOD
KARAJGI
KARWAR
HUNGAL
ANKOLA
RANIBENNUR
KUMTA
HIREKERUR
HONAVAR
BHATKAL
N
G.P.I.O. Poona, 1939.

MAP SHOWING
(A) SPRAYING AGAINST KOLEROGA ON BETELNUTS IN N. KANARA DISTRICT
AND
(B) ORGANISATION OF GUN CLUBS AGAINST WILD ANIMALS IN THE SOUTHERN DIVISION.



G.P.Z.O. POONA. 1939.


MAP SHOWING
(A) FIELD - EMBANKMENT SCHEMES PREPARED IN S. D.
AND
(B) THE AREA TRACTOR - PLOUGHED FOR REMOVING HARIALI
IN DHARWAR DISTRICT
INDI
SHINDGI
BIJAPUR
ATHANI
BAGEWADI
MUDDE
BIHAL
CHIKODI
BAGALKOT
HUKERI
GOKAK
HUNGUND
BADAMI
SAUNDATTI
RON
BAIL
HONGAL
NAVAL
GUND
DHARWAR
GADAG
MUNDERGI
N.
HUBLI
BANKAPUR
HAVERI
RANIBENNUR
FIVE FIELD - EMBANKMENT SCHEMES ●
THE AREA TRACTORPLOUGHED 100 ACRES ●
G.R.I.E.O. POONA, 1939.

(*b*) PROPAGANDA.

(8) Demonstration of improved implements especially wheat thresher stone roller, groundnut-digger and improved seed-drill and those of successful experiments on Government Farms and in cultivators' fields will continue to be held as usual. Spread of Jayawant and Gadag No. 1 cottons will receive major attention. Attempt will be made to stop illicit import of inferior cotton into the protected areas by improving the operations of the check stations and by detecting the carts on katcha roads where check stations have not been established. Spanish peanut and Pondicherry improved strains of groundnut will be multiplied and distributed in various parts of the Division. The cultivation of mixed crops like maize and tur and maize and cambodia cotton will be extended in the Gokak Canal Tract. Bunding and Fencing works will receive due attention. The Rural Uplift work at Kakhandiki and the villages selected by the Revenue Officers will be continued and will be intensified in Saswihalli group of villages where we have found a keen worker Mr. Shivangouda Patil.

(*c*) ORGANISATION.

(9) The Hubli and Gadag Cotton Sale Societies have agreed to accept the conditions of the new scheme and our close work with them will be continued. Our work with agents in the remaining 7 cotton centres will be developed. Crop protection campaigns against wild pig and deer will be extended and more gun-clubs of Arwatgi type will be organised. Attempts will be made to organise syndicates for tractor ploughing to remove hariali, a deep-rooted weed in the black soil of Karnatak, if the idea is accepted by Government.

(10) The existing taluka development associations will be guided to work according to the programmes drawn for them. The Dharwar District Agricultural Association will be revived and the Bijapur Anti-Famine Institute will continue to receive close guidance.

(11) The work of spraying against Koleroga on betelnut will be extended according to the new scheme as per Government Resolution, Revenue Department, No. P. 23-A/1442, dated 18th May 1938.

(12) The Cattle Breeding Societies will be advised to devote more attention to the technical work and attempts will be made to further the progress of His Excellency the Viceroy's Gift Bull Scheme with the aid of the Committee appointed in each district.

S. S. SALIMATH,
Deputy Director of Agriculture,
Southern Division, Dharwar.

MO-III Bk Q 10—11*a*

The following statements show how the seed was stocked and distributed during the year under report from generation to generation :—

Serial No.	Centre.	Stage.	Quantity of seed distributed in 1937-38.	Area in acres.	Quantity of produce obtained in dokras (336 lbs.) for seed.
	Jayavant Scheme.		Lbs.		Lbs.
1	Hubli ..	II ..	75	9	9
		III ..	2,800	318	212
		IV ..	37,450	4,065	1,417
		V ..	23,044	2,478	489
		VI ..	804,591	79,926	1,215
		Total ..	867,960	86,796	3,342
	Navalgund ..	II ..	100	24·14	18
		III ..	3,920	575·20	350
		IV ..	84,560	8279·19	2,000
		VI ..	276,640	23150·00	4,000
		Total ..	365,220	32029·13	6,368
	Haveri ..	III ..	2,100	92	3,164
		IV ..	44,520	2,186	
		V ..	67,120	2,838	
		VI ..	517,860	42,240	
		Total ..	691,600	47,356	3,164

Serial No.	Centre.	Stage.	Quantity of seed distributed in 1937-38.	Area in acres.	Quantity of produce obtained in dokras (336 lbs.) for seed.
	Jayavant Scheme—contd.		Lbs.		Lbs.
4	Bail-Hongal ..	III ..	2,800	350	2,401
		IV ..	18,620	1,429	
		VI ..	182,000	19,221	
		Total ..	203,420	21,000	2,401
5	Athani ..	III ..	2,100	153	45
		IV ..	5,880	323	270
		V ..	40,180	4,012	1,585
		VI ..	189,700	13,560	996
		Total ..	237,860	18,048	2,896
6	Bagalkot ..	III ..	2,800	282	62
		IV ..	6,300	333	87½
		V ..	86,800	4,485	909
		VI ..	98,910	13,670	356½
		Total ..	194,810	18,770	1,415

Serial No.	Centre.	Stage.	Quantity of seed distributed in 1937–38.	Area in acres.	Quantity of produce obtained in dokras (336 lbs.) for seed.
	Jayavant Scheme —concld.		Lbs.		Lbs.
7	Bijapur ..	III ..	2,800	164	40
		IV ..	1,540	108	18
		VI ..	189,980	10,728	400
		Total ..	194,320	11,000	458
	Gadag No. 1 Scheme.				
8	Gadag ..	II ..	420	41	32
		III ..	5,000	499	86
		IV ..	18,506	1,752	643
		V ..	150,056	12,682	4,575
		VI ..	569,602	59,367	
		Total ..	743,584	74,341	5,336
9	Ron ..	II ..	2,000	193	101
		III ..	19,356	1,639	575
		IV ..	47,881	2,836	375
		V ..	112,993	13,555	410
		Total ..	182,230	18,223	1,461

Name of centre.	Stage.	Approximate quantity of seed purchased for distribution in 1938–39.	Quantity of seed to be purchased.	Approximate total quantity of seed to be stocked for 1938–39.
		Lbs.	Lbs.	Lbs.
Jayavant.				
Hubli	II	....	2,520	2,520
	III	6,440	6,440	6,440
	IV	21,324	32,480	53,804
	V	376,712	....	376,712
	VI	458,500	....	458,500
	Total ..	862,976	35,000	897,976
Navalgund	III	4,200	....	4,200
	IV	77,140	....	77,140
	V	516,460	....	516,460
	Total ..	597,800	....	597,800
Haveri	III	3,570	....	3,570
	IV	21,000	....	21,000
	V	263,100	45,500	308,600
	VI	674,550	....	674,550
	Total ..	962,220	45,500	1,007,720

Name of centre.	Stage.	Approximate quantity of seed purchased for distribution in 1938-39.	Quantity of seed to be purchased.	Approximate total quantity of seed to be stocked for 1938-39.
		Lbs.	Lbs.	Lbs.
Jayavant—contd.				
Bailhongal	III	2,800	....	2,800
	IV	39,200	....	39,200
	V	161,980	....	161,980
	VI	92,820	....	92,820
	Total ..	296,800	....	296,800
Athani	III	2,800	....	2,800
	IV	16,240	....	16,240
	V	88,060	....	88,060
	VI	842,940	....	842,940
	Total ..	950,040	....	950,040
Bagalkot	III	2,800	....	2,800
	IV	17,430	....	17,430
	V	24,500	....	24,500
	VI	351,540	....	351,540
	Total ..	396,270	....	396,270

Name of centre.	Stage.	Approximate quantity of seed purchased for distribution in 1938–39.	Quantity of seed to be purchased.	Approximate total quantity of seed to be stocked for 1938–39.
		Lbs.	Lbs.	Lbs.
Jayavant—concld.				
Bijapur	III	2,800	....	2,800
	IV	8,980	....	8,980
	V	4,340	....	4,340
	VI	363,580	....	363,580
	Total ..	379,400	....	379,400
Gadag No. 1.				
Gadag	II	4,023	....	4,023
	III	19,581	....	19,581
	IV	139,811	....	139,811
	V	1,056,864	....	1,056,864
	Total ..	1,220,279	....	1,220,279
Ron	II	....	2,000	2,000
	III	17,768	....	17,768
	IV	82,367	....	82,367
	V	38,587	90,000	128,587
	VI	1,678	....	1,678
	Total ..	140,400	92,000	232,400

Statement showing the distribution of seeds of improved crops in the Southern Division during 1937-38.

Serial No.	Name of the Officer.	Name of the variety.	Quantity distributed in lbs.	Sufficient for sowing acres.
	Distribution of paddy strains.			
1	District Agricultural Overseer, Belgaum.	Mugad and Antersal ..	42,424 150,000 By exchange system.	700 3,500
2	District Agricultural Overseer, Dharwar.	Do. ..	80,232 By exchange system.	1,146 1,611
3	District Agricultural Overseer, Haveri.	Do. ..	218,000	3,500
4	District Agricultural Overseer, Kumta.	Kumta Farm Selections 244	594,800	7,435
		Do. 1,315	60,746	760
		Do. 1,061	110,000	1,375
5	Superintendent Kumta Farm ..	Do. 244	8,800	110
		Do. 1,315	2,960	37
		Do. 1,061	3,040	38
6	Betta Overseer, Sirsi	Halga 244 ..	5,580	50
		Maskaty 1,315 ..	440	5
		Mugad 141 ..	5,125	60
		Do. 161 ..	400	5
7	Rice Breeder, Mugad	Antarsal 67 ..	400	5
		Do. 90 ..	360	4½
		Do. 200 ..	880	11
		Mugad 161 ..	640	8
		Do. 81 ..	560	7
		Do. 249 ..	560	7
		Do. 141 ..	960	12
	Distribution of sugarcane sets.			
8	District Agricultural Overseer, Belgaum.	Java 213 ..	1,250,000	125
		E. K. 28 ..	15,000	1½
		Co. 290 ..	15,000	1½

Serial No.	Name of the Officer.	Name of the variety.	Quantity distributed in lbs.	Sufficient for sowing acres.
9	District Agricultural Overseer, Kumta.	H. M. 544 ..	5,440,000	650
10	District Agricultural Overseer, Haveri.	Java 213 ..	350,000	44
11	Betta Overseer, Sirsi	H. M. 544 ..	54,000	5½
12	Superintendent Arbhavi Farm ..	Java 213 ..	7,000	0·20
		Co. 419 ..	7,500	0·21
13	Superintendent, Kumta Farm	H. M. 544 H. M. 87 ..	12,000	1
	Distribution of wheat strain 808.			
14	District Agricultural Overseer, Gadag.	Wheat strain 808 ..	2,456	100
15	Superintendent, Dharwar Farm ..	Do. ..	3,727	93
16	District Agricultural Overseer, Bailhongal.	Do. ..	10,320	430
17	District Agricultural Overseer, Chikodi.	Do. ..	422	10
18	District Agricultural Overseer, Bijapur.	Do. ..	9,840	328
19	District Agricultural Overseer, Bagalkot.	Do. ..	960	24
	Distribution of groundnut strains.			
20	District Agricultural Overseer, Gadag.	Pondicherry St. 8 ..	2,804	40
		Spanish peanut 5 ..	880	10
21	Superintendent, Dharwar Farm ..	Pondicherry St. 8 ..	2,421	30–10G
		Spanish peanut 5 ..	1,030	100–30G
		Valencia	79	0–30G
22	District Agricultural Overseer, Bailhongal.	Pondicherry St. 8 ..	3,600	40
23	District Agricultural Overseer, Chikodi.	Spanish peanut 5 ..	85	0–20
24	District Agricultural Overseer, Bagalkot.	Do. ..	2,180	25

APPENDIX F.

Summary of Work done under the Deputy Director of Agriculture, Gujarat, Surat, for the year 1937-38.

I—STAFF.

Rao Bahadur Tamhane continued as officiating Deputy Director of Agriculture, Gujarat, Surat, till 20th May 1938.

2. Mr. P. L. Patel, Cotton Breeder, Broach, was required on grounds of health to proceed on leave from 1st October 1937 to 21st November 1937.

II—SEASON.

3. The monsoon started normally in the third week of June and the sowing of all kharif crops was taken up in right earnest throughout the Division. This however did not last long as the rain was continuous and heavy at intervals in the month of July. It had therefore to be delayed in some cases till August which was practically dry. The prolonged draught period created anxieties in the minds of cultivators which were relieved with timely rains in the second week of September. There was no rainfall in October which was very hot and sultry all throughout and the monsoon may be said to have been closed by the end of September. In fact the season was irregular and though the total rainfall was more than the average the cereal crops and Groundnut were much affected particularly in Kaira, Panch Mahals and Ahmedabad. Besides in absence of late rains in October the other crops also suffered to some extent and the difficulty was aggravated by the unprecedented slump in cotton prices which is the principal money crop in this Division.

III—RESEARCH AND EXPERIMENTAL WORK.

(1) Crop Breeding.

Surat.

4. *Cotton—Replication tests.*—1027 A.L.F. B.D. 8, Segregate 8-1 Selection 16 and Segregate 22-3-2 were tested in eight randomised replications. The area of each sub-plot was 1·37 gunthas. In yield of seed-cotton Segregate 8-1 was the best, next comes 1027 A.L.F. B.D. 8 and Selection 16-1 in order of merit. The lowest yield was of Segregate 22-3-2 which was significantly lower than 8-1 only. In yield of lint Segregate 8-1 again is the best followed by Selection 16, 1027 A.L.F.; Next comes B.D. 8 and last stands 22-3-2. Due to the peculiarity of the season the fibre is longer and finer than usual, the maturity being rather poor. Segregate 8-1 has got the best length with somewhat low maturity. Segregate 22-3-2 did not maintain its superior fibre length and had the poorest maturity.

5. *Spinning tests—*

Name of the type.	Average ginning per cent. of lint.	Average staple length Bolls Sorter in inch.	Fibre weight per inch.	Fibre maturity.	Valuations per Candy in Bombay.	Highest Standard Warp counts.
1	2	3	4	5	6	7
					Rs.	
1027 A.L.F. ..	33·3	0·99	0·155	46/27	70 On.	
Broach Deshi 8 ..	31·2	0·91	0·146	58/28	60 On.	
1A Cross 8–1 ..	37·1	1·01	0·153	47/30	70 On.	
1A Long Boll ..	38·0	0·88	0·181	51/30	47 On.	
Jayawant cross 22–3–2.	32·4	0·96	0·135	35/35	55 On.	

According to the spinning tests of 1937–38, 1027 A.L.F. : and Seg. 8-1 which have been valued the highest by the graders have been adjudged suitable for spinning 38's and 35's warp counts respectively while Selection 16, the lowest in valuation had been found suitable for 35's. The second in order of valuation are Seg. 22–3–2 and B.D. 8 with the spinning performance of 45's and 43's, higher than the Standard 1027 A.L.F.

6. *Crosses.*—Selection was continued in all the crosses and the back crosses including those intended for combining wilt resistance and grown on wilt affected land of Surat Farm. With a view to get higher wilt resistance the crossing is done with the pollen from B.D. 8 of Poona on two back crosses, viz. [(1027 × B.D. 8) F_2 × B.D. 8 F_1] × B.D. 8 B 3 and [1027 × (B.D. 8 × N.S. 12) F_1 × 1027 A.L.F.] × B.D. 8 B 3.

7. *Interspecific Hybrids and Back-crosses.*—23 Hybrids are now maintained and 13 cuttings from the same have also been established. Out of the Back-crosses 9 plants are available which show increased fertility by way of second Back-crossing with the exotics and six show fertility on selfing.

8. *Selection from Local.*—Selection 9 of 1932-33 is definitely found to give a type with high ginning—from selections of 1935-36 and 1936-37 four having staple characters superior to those of 1027 A.L.F. are discovered but they have a lower ginning outturn.

9. *Seed production.*—Selfed seed 550¾ lbs. of 1027 A.L.F. (2) 131¼ lbs. of 1A Long Boll and (3) 29½ lbs. of B.D. 8 was produced out of which 536½ lbs. of 1027 and 26¼ lbs. of B.D. 8 were supplied to the Superintendent, Surat Farm, and 122 lbs. of 1A Long Boll to the Cotton Superintendent, Surat, for multiplication in the District 20 lbs. Selfed seed of

each 1027 A.L.F. and 1A Long Boll were supplied to Baroda State as a basic stock for seed multiplication to be carried out in their on territory.

10. The system of dibbling 3 and 4 seeds at the normal time of sowing was compared with the ordinary method. The crop was well established in the season and this will therefore be repeated next year. The method of preserving Selfed seed with Calcium chloride so as to maintain its germination was again tested and had been found to be successful for 1027 A.L.F.

11. *Jowar.*—20 types were maintained pure by selfing. 39½ lbs. of Selfed seed of B.P. No. 53 was produced of which 35½ lbs. were supplied to the Superintendent, Surat Farm, for multiplication.

Broach.

12. *Cotton.*—This is the sixth season of the cotton work financed by the Indian Central Cotton Committee.

Crosses.—Two crosses (B.D. 8×G.A. 26) F_7 and (B.D. 8×G.A. 26—F_1)×B.D. 8—F_5 has yielded in 1936-37 14 best segregates highly resistant to wilt, ginning 36 to 40 per cent., staple length 22 to 23 mm. and spinning 31 to 37's. This year one of the best plants from each of the 14 segregates was sown in random replications to test resistance in heavily wilt-infected soil. The results show that the straight cross segregates are comparatively more susceptible than the back cross ones.

Ginning outturn.—The results of ginning outturn of both the single plant progeny and the bulk seed in wilt free areas show that except two segregates 76-10 and 76-14 each of the remaining has the ginning percentage higher than B.D. 8 by 5 or more per cent.

Staple length.—There is not much scope for choice as the mean fibre length of all segregates except one (5·17) is somewhat between 21 to 22 mm. which is as good as that of the quality parent B.D. 8.

Yield.—The mean yield figures of the single plant progenies of the 14 segregates grown in 9 random replications in wilt free area indicate that all are high yielders but the statistical analysis indicate that the yield difference between B.D. 8 the quality parent and the segregates are not significant in majority of cases. When the results of all the four characters, viz. (1) wilt resistance, (2) ginning per cent., (3) fibre length, and (4) yield are considered together, it is found that Segregates 76-1, 76-8 and 76-12 of the straight cross B.D. 8×G.A. 26—F_7 and 1-2, 1-6, 1-10, 5-18, 6-20 and 6-25 of the back cross (B.D. 8×G.A.-26-F_1) ×B.D. 8—F_5 are worth retaining for further testing.

Three crosses, viz. B.D. 8×1027 A.L.F.—F_3 (B.D. 8×1027 A.L.F.—F_1) B.D. 8—F_2 and (B.D. 8×N.S. 12—F_1)×1027 A.L.F.—F_2 will be handed over to the Wilt Breeding Scheme for Surat area as they may prove very useful for that tract.

13. *Selection.*—New selection 49 which is highly resistant to wilt gins 34 per cent. and spins 31's was maintained as a new type along with old ones.

14. *Yield trials of B.D. 8 and N.S. 12.*—New selection 12 which on an average gins 39 per cent., spins 26½'s and is as good as B.D. 8 in resistance to wilt was also tested with B.D. 8 for yield this year. In three years' trials it has been found superior to B.D. 8 and has given statistically higher yields in two seasons (1936-37 and 1937-38). This strain will now be included in yield trials along with the Segregates of crosses mentioned in the beginning of the report.

Pure types four Deshi and six Goghari types, B 9 [1] (from a cross) New selections 12 and 49 were maintained pure by selfing.

15. *Seed multiplication.*—Strain Broach Deshi 8 which is being distributed in the District since 1935-36 was multiplied on 2½ acres this year and 1,100 lbs. pure and 210 lbs. selfed seed was produced.

16. *Spinning tests and fibre analysis.*—Fourteen Segregates were sent to Matunga Laboratory for estimation of spinning values from fibre analysis. The values reported by the Laboratory ranged from 31's to 37's. In addition to these strain B.D. 8, New selection 12 and 49, Broach Local were actually spun by the Laboratory. B.D. 8 gave 37 to 39's while New selection 12, 49 and Broach Local spun 21, 30 and 12½'s respectively.

17. This Scheme completed its first five years on 31st March 1937 and has been further extended for another period of five years as per G. R., R. D., No. 7781 of 4th May 1937.

Nadiad.

18. *Tobacco.*—The methods of controlling the "Damping off" fungus disease in tobacco nurseries under the advice of the Plant Pathologist to Government of Bombay are being worked. In the year under report the treatment of coppersulphate solution which had a marked effect during last season was not found to be so effective.

19. *Selection in Keliu variety.*—23 selections spread out in 69 units were studied plant to plant for 6 important characters. Last year's best yielding Selections Nos. 24 and 49 maintained their high yield over the Local.

The Selections Nos. 22, 24, 49 and 81 were tried with Local Keliu in plots of 4 randomised replications, each plot measuring 0·9 gunthas. Only No. 24 was found to be significantly superior to Local by 22 per cent. Careful trials of 24 and 49 will be continued for one year more so as to arrive at a definite conclusion.

20. Cross Breeding for purposes of Bidee and Cigarette manufacture is carried out but the cultures do not show all the desired characters and the types had to be kept in abeyance.

21. *Cigarette tobacco.*—The cost of flue-curing this year has come down to Re. 0–1–8 per lb. of dry leaf as against Re. 0–2–6 per lb. average of last three years.

This season the sale rate of the cured leaf has been Re. 0–5–10½ per lb. against Re. 0–5–3 per lb. for the previous three years. The leaf was sold to two large scale purchasers and cigarette manufacturers in Bombay and they have opined quite well about the quality. Samples were also sent to Indian Leaf Tobacco Development Company, Chirala, Madras, Messrs. Cox & Kings, London, and the Bureau of Agricultural Economics, U.S.A., Department of Agriculture. All these report very favourably and the Bureau of Agricultural Economics appreciates samples of white Burley the best and recommends the cultivation of that type in Gujarat. The Bombay merchants are prepared to go in for a contract for purchasing up to 8 lac lbs. of this sort of leaf and the cultivators are now coming forward to grow it. It may be said therefore that cigarette tobacco crop has found a footing in Gujarat though it yet requires some improvements for the required flavour and *sweetness.*

22. *Bajri Breeding.*—The Bajri Breeding Experiment is now in its ninth year. By the end of last year it was found that type No. 207 has been giving about 12 to 14 per cent. higher yield than Local under replication tests continuously for four years. The type No. 206 has been closely following No. 207 in yield. In the plant to plant study series most of the 28 individual cultures in type 207 are found to be practically pure for pigmentlessness. It is also observed that the selections have not improved the Standard 207 any further and there is not much hope of improving it beyond what has already been achieved.

District trials were taken in several places with type No. 207 and Local but on account of draught and heavy rains at different stages of the crop growth no actual figures could be had. However nowhere the type is found to be unsuitable or poorer than Local and at some places there is enough appreciation of the high yielding capacity of 207 to justify further trials in the District.

23. *Castor Breeding.*—Selections are continued in the direction of higher and higher per cent. of female flowers in the spike of the two types S-20 and S-5 which are considered practically pure. It is to be noted here that continued selfing for more than 10 years has not been successful in reducing the *end stemmed* impurity to absolute zero.

District trials.—Type S-20 has been appreciated as a good yielder in Kaira District while type S-5 has been found to be suitable at Baramati and Belapur.

Viramgam (Ahmedabad District).

24. *Cotton—Replication tests.*—Four types, viz. (1) Local Wagad, (2) Wagad 8, (3) Segregate 4-1 and Segregate 7-1 were tested in 6 randomised replications the area of each plot being 1·64 gunthas. The first three are under trial for the last five years. The following statement shows the average performance.

Comparative tests of Local Wagad, Wagad 8 and Segregate 4-1 Average of 1933-34 to 1937-38 :—

Type of Cotton.	Yield of seed-cotton per acre in lbs.	Ginning per cent.	Yield of lint per acre in lbs.	Fibre length in inches.	Spinning value.			
					1933-34.	1934-35.	1935-36.	1936-37.
1	2	3	4	5	6	7	8	9
Local Wagad ..	506	35·2	186	·815	18	16½	12	19*
Wagad 8 ..	568	39·5	232	·793	17	14	12	13½
Segregate 4-1 ..	527	42·4	232	·785	24	20	14	15

*Due to insufficiency of produce in 1936-37 the spinning tests of Local Wagad were done by adding half the quantity of lint locally procured.

Segregate 4-1 is distinctly superior to Local Wagad and Wagad 8 in Ginning percentage giving about 40 lbs. more lint per acre than the former. It has also soft feel. It is adversely affected in spinning value due to deficient rainfall in 1935-36 and 1936-37 and is on an average slightly superior to Local Wagad for this character. Segregate 7-1 is being tried since 1935-36. It is as good as Wagad 8 in yield of seed-cotton and as high ginning as Segregate 4-1. It is also superior to Local Wagad in spinning value (by 7 counts). Its chief defect however is that the boll opening is too wide for being taken up in general cultivation in the Wagad tract. It is therefore being tried in the Lalio tract of Ahmedabad District.

25. *Selections.*—Out of 235 individual plant progenies grown 104 plants (representing 36 families) with ginning 37 per cent. and above and fibre length 21 mms. and above are selected for next year's progeny row cultures. Ten promising families of these (Bulk seed) will be tested on a small scale for yield and other economic characters—with Wagad 8 and Local Wagad as checks. These include three families, viz. (7-A-99-101) sorted out on the basis of the results of this year's preliminary replication tests.

30 Bulk samples were collected from the whole of Wagad tracts of these 46 individual plant selections have been sorted out for progeny row cultures.

26. *Herbaceum cottons from Persia and Russia.*—240 individual plant selections sorted out from the material collected from Iran together with 9 Bulk samples were received through the Institute of Plant Industry, Indore and grown at Viramgam. 15 types of Russian cottons were also grown. Both cottons were found to be affected more or less by Anthracnose. Preliminary crosses of Wagad 8 with Persian types for quality and with the Russians for earliness have been made.

27. *Jowar.*—Four selections, viz. C. 8-2, C-10-2, U. 3-4 and U. 11-4 of 1930-31 were tested in six randomised replications with Local Chhasatio and Local Utavali as checks. The area of each plot being 0·83 gunthas. None of the selections is found promising in grain yield. U. 11-4 is equal to Local Chhasatio. Local Utavali is significantly superior to all the selections except U. 11-4 wherein the difference is just below 5 per cent. level of significance. In fodder yield C-10-2 is significantly superior to the rest; while C. 8-2 is equal to Local Chhasatio and superior to Local Utavali.

Of the 7 selections of Chhasatio and 5 of Utavali of 1933-34 grown in line cultures four from each are continued for further study. During the year, 31 selections of Chrasatio and 17 that of Utavali have been made afresh for growing in plant to row cultures next year.

(2) Experimental Station Work.

(*a*) *Surat Agricultural Station.*

28. *Seed multiplication.*—Cotton 1027 A.L.F. was grown on 53 acres and 14½ gunthas giving 470 lbs. of seed-cotton per acre on an average. 14,016½ lbs. of the resultant seed was supplied to the Cotton Superintendent, Surat, to be grown in selected villages of seed groups for further multiplication, out of which 10,982 lbs. was of the II stage and 3,034½ lbs. of the III stage. B.D. 8 cotton was grown on 11 acres and 16 gunthas and the resultant seed 460 lbs. of II stage and 2,781 lbs. of III stage was supplied to the District Agricultural Overseer, Broach, for multiplication in Broach District. Besides 1,100 lbs. of this seed was supplied to Baroda State.

Jowar No. 53 (Budh Perio) was grown on 56 acres and 36½ gunthas giving 779 lbs. grain per acre. 18,673 lbs. of pure seed was distributed through the Cotton Superintendent, Surat, and 867 lbs. directly from the Farm.

29. *Cotton on high* v/s. *low ridges.*—The experiment was carried out as described in paragraph 30 of 1934-35, Annual Report. Farm yard manure at 10 cart-loads per acre was given to cotton crop. There was practically no difference in germination. The percentage increase in yield over control i.e., ordinary *flat* is as under :—

Treatments.	Percentage increase over Control.
(1) Flat (interculturing with a shovel cultivator)	—2·20
(2) Low ridges	4·92
(3) High ridges	3·44
(4) High ridges with disc	3·53

None of the treatments is significant. The experiment will be discontinued from 1938–39.

30. *Manurial experiments—(Sulphate of ammonia).*—The experiment reported in paragraph 32 of last year's report was continued. The percentage increase or decrease of yield over Control, i.e. no-manure, is as under :—

Treatments.	Yield in lbs. per acre.	Percentage increase or decrease over Control.	Extra cost of manuring and picking over Control.	Value of increase or decrease over Control.
			Rs. a. p.	Rs. a. p.
1. No-manure (Control)	218·39	....	....	....
2. 10,000 lbs. Farm yard manure once in six years	388·87	78·06	1 5 2*	17 0 9
3. 10 lbs. N. at sowing	366·89	67·99	6 9 6	14 13 7
4. 20 lbs. N. at sowing	367·09	68·08	9 6 0	14 13 10
5. 40 lbs. N. at sowing	413·62	89·39	15 12 7	19 8 4
6. 10 lbs. N. after stand	410·25	87·85	5 10 11	19 3 11
7. 20 lbs. N. after stand	446·29	104·35	9 15 10	22 12 7
8. 40 lbs. N. after stand	409·67	87·31	15 12 1	19 1 1

*Extra cost of picking only. The whole cost of Farm yard manure was taken into account in 1933–34.

The experiment is significant. All the treatments are significant over the Control but none over the general mean.

31. *Residual effects of manurial treatments to cotton on the next jowar crop.*—In grain yield 20 lbs. N. after stand and 40 lbs. N. after stand are significant over no-manure (Control), 10 lbs. N. at sowing and 20 lbs. N. at sowing. In fodder yield 20 lbs. N. after stand is significant over 20 lbs. N. at sowing and 40 lbs. N. after stand is significant over no-manure (Control) and 20 lbs. N. at sowing.

32. *Spacing experiment.*—The experiment reported in paragraph 34 of last year's report was continued and the results are as under :—

Treatments.	Yield in lbs. per acre of	
	Dibbling.	Drilling.
1· 3′ × 3′	380·49	363·11
2· 4′ × 3′	401·06	344·74
3· 4′ × 2′	438·68	411·51
4· 5′ × 2′	406·34	342·98
5· 6′ × 2′	417·12	394·90

The experiment is insignificant. None of the treatments is significant.

Residual effects of wider spacing of cotton on next jowar crop.—

Grain .. { Dibble 4′ × 2′ .. ; Dibble 6′ × 2′ .. ; Drill 5′ × 2′ .. } are significant over Drill 6′ × 2′.

None of the treatments is significant over general mean.

Fodder .. { Dibble 5′ × 2′ .. ; Drill 3′ × 3′ .. ; Drill 5 × 2′ .. } are significant over Dibble 4′ × 3′.

Dibble 6′ × 2′ is significant over Dibble 4′ × 3′ and Drill 6′ × 2′.

This experiment also will be discontinued from next year (1938–39).

33. *Cotton green manuring experiment.*—The experiment reported in paragraph 36 of last year's report was continued.

Dhaincha plants were buried in the soil when they were two months old. Their weight was as under :—

	Green stuff per acre in lbs.
With manure	9,361
Without manure	7,834

The yield results are as under :—

Treatments.	Yield of seed cotton per acre in lbs.	Percentage increase or decrease over Local.
1. Cotton (Control)	382·66	....
2. Cotton + Farm yard manure	382·16	—0·13
3. Cotton + Farm yard manure + Dhaincha ..	237·30	—37·98
4. Cotton + Dhaincha	215·00	—43·81

Cotton (Control) and Cotton + Farm yard manure. are significant over Cotton + Dhaincha and Cotton + Farm yard manure + Dhaincha.

The long break in rain in August had bad effect on Dhaincha as well as Farm yard manure plots.

34. *Residual effects of green manuring cotton on next year jowar crop.*—In grain none of the treatments shows significant difference. In fodder Farm yard manure + Dhaincha is significant over Control and Dhaincha.

35. *Jowar green manuring experiment.*—Owing to continuous heavy rains up to the end of July and abnormally prolonged draught in the whole month of August and early September Dhaincha green manure crop could not be established early in the season. Its growth in August was very poor (only about 6″) and it could not be ploughed in till the end of September, thus the jowar crop (Nialo) following it could not be sown till the beginning of October.

Germination of Nialo was poor and growth still poorer in absence of late rains. Hence Nialo jowar did not give any yield this season. There is nothing to compare therefore, so far as this year's experiment is concerned, and hence the year under report will not be taken into account while working out average results in future. It is learnt from a season like this that to be on safe side, Dhaincha seed for green manuring may be put in dry soil before monsoon to avoid the above difficulty as far as possible.

Residual effect of green manuring in jowar on next cotton crop.—The yield results are as under :—

Treatments.	Yield of seed cotton per acre in lbs.	Percentage increase or decrease over Control.
1. Control (No-manure)	365·86	....
2. Farm yard manure	389·55	6·47
3. Farm yard manure + Dhaincha	587·69	60·63
4. Dhaincha alone	508·37	38·98

The experiment is significant.

Dhaincha alone is significant over Control and Farm yard manure. Farm yard manure + Dhaincha is significant over all treatments and over the general mean also.

36. *Rotational experiment.*—This is the fifth year of the experiment and was conducted as described in paragraph 40 of 1935–36 Annual Report.

In treatment "A" Dhaincha plants were buried after growth of 87 days. Its height was 78 inches and the green stuff buried was 26,016 lbs. per acre. The yield results are as under :—

Treatments.	Yield of seed cotton per acre in lbs.	Percentage increase or decrease over Control.
(G) Cotton after jowar (No-manure)	436·16	....
(B) Cotton after green manure (Fallow)	968·24	121·99
(D) Cotton after jowar	452·32	3·69
(F) Cotton after jowar	413·62	−5·16

37. *Residual effects on next jowar crop.*—The results are as under:—

Treatments.	Yield of grain in lbs. per acre.	Percentage increase or decrease over Control.	Yield of fodder per acre in lbs.	Percentage increase or decrease over Control.
(H) Jowar after cotton (Control) ..	817·7	..	1,217·3	..
(E) Jowar after cotton	878·9	7·48	1,205·9	0·09
(C) Jowar after cotton	970·4	18·67	2,174·11	78·60

Grain—Jowar (C) is significant over Control but not over general mean.

Fodder—Jowar (C) is significant over Control and general mean.

38. *Trial of defibrated cotton seed.*—Like last year three types of cotton seed, viz. (1) Black, (2) Semi-black, (3) White and black were tried to see whether defibrated seed which requires no application of mud unlike raw seeds can give a good stand under field conditions. The germination and final stand was defective as in last year.

39. *Surat Dairy.*—During the year under report there was a sale of 30 surplus Dairy animals by auction and 3 Breeding bulls were supplied in the District. The strength of the herd on 1st April 1938 was 103 as against 115 of last year. The health of the herd remained good on the whole. There were five deaths during the year. The milk production and realization from the sale of Dairy produce during 1936-37 and 1937-38 were as under:—

Year.	Total milk in lbs.	Average number of adult cows in the year.	Annual average per cow in lbs.	Total realization.	Average rate in lbs. per rupee.
				Rs.	
1936-37	73,621-12	33·3	2,211	5,729	12·85
1937-38	70,803-0	32·5	2,178	5,421	13·06

(*b*) *Broach Farm.*

40. *Selection—Jowar Breeding.*—53 plants from 14-8 and 10 from 222-2 A in F_2 generation were selected for further study. The types from Broach Local are not promising for yield. 10 pure lines were maintained by selfing, and no new crosses were done this year.

41. *Wheat Breeding—Selection.*—The seed this year was one which survived the rust attack last season. 35 plants in the hard white and 25 plants in the hard red variety of 9 and 5 single plant progenies respectively were obtained. They need trying again before any of them is rejected.

Preliminary yield trials on the bulk seed of 1935-36 gave 21 cultures of hard white and 18 of hard red variety on good yield basis.

Yield trial of Bansi strains.—These were conducted in comparison with the Local variety. Local wheat have been found significantly higher yielding than either 224 or 168. There was no significant difference between the Bansi strains themselves. Local was later by a week and best in tillering. 168 was earliest and least tillering.

42. *Dhaincha green manuring to jowar.*—Half of the jowar crop was green manured with Dhaincha and half was not manured. The crop which was green manured gave significant higher yields of grain and fodder than the Control or no green manured jowar. The results of the study of residual effect of green manure applied to Rabi jowar of last year on subsequent cotton crop taken this season do not show any significant difference in yield.

43. *Cotton sown on ridges* v/s. *flat.*—Cotton sown on ridges 4 to 6 inches high and that sown on flat showed no difference in germination and no significant difference in yield.

44. *Spanish Peanut.*—Due to the long break of rains in the month of August the yield of this variety suffered so much that it was less than half of the average in previous years.

45. *Natural cross pollination in wheat.*—The first part of the trial was conducted this year. Mixed seed of white and red variety of wheat was sown and after harvesting the grains were sorted out into white and red. They need sowing again for further examination.

(c) *Dohad Farm.*

46. All experiments have been discontinued in view of the Farm being turned into a Seed-Farm. The chief object is to produce and multiply pure seeds of desired strains of good quality for further distribution in the tract. The quantities of improved seeds supplied from the Farm are as under :—

Maize	15,691	lbs.
Anklo Paddy	256	,,
Jirasal Paddy	1,035	,,
Kamod Paddy	317	,,
Spanish Peanut	4,906	,,
Gram	2,257	,,
Wheat Pusa 4	1,152	,,

47. *Demonstration.*—A party demonstration was held on the Farm under the leadership of the Assistant Collector, Panch Mahals. The function was attended by the Mamlatdar of Dohad, Veterinary Assistant Surgeon, District Agricultural Overseeer, Godhra, and about 300 cultivators from nearly 40 villages. The advantages of wider sowing with drills, importance of pure and graded seed, use of better fodder such as Sundhia and Berseem, and the best method of preparing Farm yard manure were explained, and the Veterinary Assistant Surgeon stressed on the desirability of early castration.

IV—PROPAGANDA.

Ahmedabad District.

48. *Trials in cultivators' fields.*—Cotton—Segregate 4-1 was tried in Viramgam Division but due to vagaries of the season the results are not normal. Similarly the open boll type 7-1 was tried and the results are not definite. Looking to the past records of the type it is not going to be equally successful as Segregate 4-1.

Banilla.—This has done well under irrigation and is finding favour with the cultivators of Panchal tract.

Wheat.—No. 224 has done better in Dholka and Dhandhuka Talukas than the Local Dhola-katha under dry conditions. Under irrigation it has fared well in Viramgam Taluka also.

No. 808.—has given promising results over Local under dry conditions in Dholka and under irrigation in Viramgam and Prantij.

Pusa—52.—It was tried throughout the District. This is an early type and rust resistant and has done well.

Sugarcane.—Co. 213, Poj. 2878 have maintained their area and six more types have been planted at two places where Co. 213, Co. 290 and 219 have yielded better.

Groundnut.—Magadi type was tried in Viramgam and Prantij Sub-Divisions. The crop in Viramgam Taluka failed at all places. In Prantij it was not found equally suitable with Local however the culivators prefer it due to earlyness, thin husks and well developed kernels.

Spanish peanut.—This is a very early type and has a future in this District wherever groundnut is taken as a mixed crop with castors. The results in Prantij Taluka show that though the outturn of Spanish peanut is not on par with the Local, the yield of castors with Spanish peanut has decidedly increased. This variety is not much in favour with the people because of the small size of seed.

Jamnagar Giant Bajro.—This variety is found to deteriorate and has yet kept up its yield quality. Its fodder however is much inferior. Besides due to lateness in ripening it is losing ground.

49. *Manurial.*—Trials on Groundnut and Paddy with a doze of 56 lbs. Superphosphate and 80 lbs. Sulphate of ammonia respectively per acre were conducted in Prantij Taluka and the results have been found to be favourable.

50. *Cultural.*—Trials of wider sowing of cotton were conducted in Viramgam and Dholka Sub-Divisions. Results of Viramgam are not available due to failure of season for the cotton crop and those of Dholka are in favour of wider sowing.

Wider sowing of wheat 16" apart was tried in Dholka and has proved of advantage over Local seed-drill 12" apart. Dibbling of cotton 2' × 2' in Prantij Taluka gave better results than 2' drilled crop. This method is being adopted in the District.

51. *Fruit culture.*—Cultivation of mosambi, basrai bananas, chikoo and grafted mangoes is on the increase, everywhere and all possible help is given to growers.

52. *Demonstrations and Shows.*—A big District Agricultural Show was organized at Sanand under the Patronage of the District Agricultural and Livestock Association, Ahmedabad. Nearly 60,000 people visited the Show during the period. It was opened by His Excellency Sir Roger Lumley.

53. *Pest and Diseases.*—Dusting of Sulphur on mango trees is being practised with good effect for controlling mango-hoppers. Similarly it was dusted on Jira for mildew and proved very useful in controlling the disease.

53. (*a*) *Distribution of seeds, plants, etc.*—

San seed	2,200	lbs.
Paddy (different varieties)	4,425	,,
Wheat (different varieties)	2,625	,,
Fruit plants—Mosambi, Chikoo, Bananas, Mango grafts, etc...	3,580	Nos.
Castors	260	lbs.

Panch Mahals District.

54. *Trials in cultivators' fields—Cultural trials—Broad v/s. Narro sowing.*—There were 11 plots laid out for the trial in maize crop. Out of these three were damaged by hairy caterpillars. The average yield per acre of the remaining 8 plots was lbs. (848) in 18" wider sowing against 790 lbs. per acre in 10" apart—giving an increase of 8 per cent. At any rate there is no fall in yield.

Manurial trials.—Six plots of paddy were treated with 112 lbs. Sulphate of ammonia in two dozes—one just after transplanting and the other

just before flowering. The treated plots gave on an average 1,444 lbs. grain per acre when compared with 1,154 lbs. per acre in plots having no treatment. The application showed an increase of 25 per cent. during the season.

Varietal trials.—Paddy strain K. 540 was tried at five places in comparison with Local Sutarsal. The results show that the new strain yielded 1,950 lbs. per acre against 1,224 lbs. of Sutarsal per acre. It is very likely to spread in the vicinity during the next season.

55. *Spanish peanut v/s. Small Japan.*—The trial was carried out at two places with the result that Spanish Peanut yielded 592 lbs. per acre against 499 lbs. of Small Japan. The variety has shown distinct advantage in yield during the year.

56. *Sugarcane.*—Three varieties were under trial Poj. 2878, Co. 290 and Co. 213. It has been observed that Co. 290 is superior to all in respect of yield and gul quality. Nine multiple furnaces continued working in Kalol Taluka. The area under cane decreased due to higher rates of Groundnut and reduced rate of gul. During this season the price of gul has gone up (i.e., 2-4-0 to 2-12-0 per maund against 1-12-0 per maund of last year) and that of Groundnut has gone down with the result that the area under sugarcane is likely to increase.

57. *Distribution of seeds, manures and implements :—*

Maize seed	12,320	lbs.
Groundnut	7,950	,,
Yellow gram	7,820	,,
Wheat Pusa 4	1,550	,,
Bajri	930	,,
Sundhia	1,030	,,
San seed	4,800	,,
Sugarcane Co. 290	5,000	Sets.
,, Poj. 2878	3,200	,,
,, E. K. 28	2,500	,,
,, Co. 213	3,000	,,
Sulphate of ammonia	20	tons.
Karachi ploughs	5	Nos.
Crushers	4	,,
Pans	8	,,

58. *Village Up-lift.*—The Jhalod Agricultural Scheme was continued during the year and various Agricultural improvements are being demonstrated in cultivators' fields by a Kamgar appointed specially for the purpose.

Kaira District.

59. *Trials in cultivators' fields—Cultural.*—Wider sowing of cereals 15″ to 18″ apart as against 12″ Local method and of groundnut 22″ to 24″ apart was carried out in 24 villages on an area of 536 acres cereals and 395 acres groundnut crop. Besides the use of a Broach harrow in preparing tobacco lands was newly introduced and tried by 50 cultivators in 11 villages and 39 such harrows were distributed from the Village Up-lift grant. The harvesting of groundnut is a costly item in growing that crop. A method has been devised of working fenia in between groundnut rows which facilitates easy and effective working of a harrow for up-rooting the crop. This method was tried on an area of 1,398 acres by 50 farmers in 11 villages and 44 new fenias were supplied in the District.

60. *Varietal.*—Wheat 224, Pusa 4, and 52, Magadi groundnut have a natural spread in the District. Bajri 207 and Castor S-20 were tried but due to rains at the time of maturing the former was damaged and the latter suffered from frost.

61. *Manurial.*—The use of artificial manure is widely known and nearly 300 tons must have been used. Similarly 4 tons of Bone-meal was supplied for fruit trees. In order to make up the deficiency of organic matter 4,000 lbs. of san seeds were supplied in six villages for trial as a green manure for tobacco.

62. *Distribution of seeds, plants and manures, etc.*—

San seed ..	4,000	lbs.	*Tobacco seed*—	lbs.
Bone meal ..	4	tons	Keliu ..	17
Sulphate of ammonia.	300	,,	Gandiu No. 6.	12
Denatured salt ..	28,280	lbs.	Cotton seed	
Sulphur for dusting ..	4,600	,,	Broach Special.	11,980
Sulphur packets ..	1,202	Nos.	Wheat No. 224	13,840
Sugarcane ..	21,625	Sets.	,, Pusa 4 ..	2,230
Mango grafts ..	475	Nos.	,, Pusa 52 ..	1,120
Basrai Bananas ..	18,700	,,	Magadi Groundnut	5,000
Chikoo ..	55	,,		
Guava ..	1,945	,,		
Pomegranate ..	300	,,		
Kagadi Lemon ..	800	,,		
Grape fruits ..	80	,,		
Seed drills (wider) for Cereals ..	23	,,		
Seed drills (wider) for Groundnut ..	7	,,		
Broach harrows ..	39	,,		
Groundnut Up-rooter.	44	,,		

63. *Sulphur dusting against Jira mildew.*—The attack was not very severe and the area under the crop was low due to increased acreage of potatoes. During the year dusting operation was carried out in 37 villages on 395 Bighas and 201 cultivators took its advantage. Besides 52 mango trees were treated against mildew and hoppers attack.

64. *Horticultural propaganda.*—Improvement of country mango trees was taken up by side grafting. 490 mango trees were grafted in 17 villages. The season was not favourable and the percentage of success was therefore low. The Agricultural Sub-Overseer visited 122 fruit gardens and assisted in starting 22 new fruit plantations.

65. *Village Up-lift.*—During the year Rs. 833 were provided for the introduction of improved seeds, implements; At Anghadi in Thasra Taluka 7 hens and 2 cocks of white leghorn were supplied from the Central Poultry Farm at Kirkee from the Village Up-lift grant.

66. *Roze-killing campaign.*—A special Shikar party was engaged under the Shikar Officer as the crops are considerably damaged by these animals. The party worked for 60 days and killed 97 pigs and 165 Nil-gais.

Broach District.

67. *Cotton.*—B.D. 8 cotton seed extension scheme has considerably increased in volume in spite of many difficulties in the past seasons. This cotton was at its best for its distinct superior qualities owing to favourable season when wilt in the severe form was noticed (25 to 30 per cent.) in Goghari cottons owing to high percentage of moisture.

From the controlled area of 2,004 acres 640,000 lbs. of seed and 816 full pressed bales of lint were obtained. The latter was sold at a premium varying from Rs. 44 to Rs. 54 on Broach terms. In all 2,035 full pressed bales of B.D.8 were put into market including those of non-controlled area and they realized almost the same premium. Much of the B.D.8 seed-cotton was purchased by gin-owners at a price higher than Goghari from Rs. 2 to Rs. 4 per bhar of 1,020 lbs. The pedigree resultant seed amounting to about 131,200 lbs. was distributed for sowing in 1938. Besides 44,800 lbs. of B.D.8 seed was supplied by the gin-owners. It has been observed that the cultivators, gin-owners and merchants have all realized the importance of this strain during the current season and it is hoped that B.D.8 cotton will have better prospects in future years.

68. *Jowar strain No. 8.*—No village trials were taken as it was proved to be superior to Local varieties in yield and quality. Its natural spread has been found to an extent of about 1,500 acres in some villages.

69. *Wheat No. 224.*—The severe attack of rust during previous year had mostly destroyed the crop and thus the area had been reduced under this strain during the year. An area of about 125 acres was grown from the seed preserved by prospective farmers and it is hoped that the area will increase next season if there be sufficient late rains.

70. *Groundnut.*—This crop is spreading very slowly as it has not yet appealed to the cultivators for the fact that the yield is low and harvesting is costly due to heavy conditions of soil. It is being grown on scattered fields in different villages.

71. *Demonstrations and Shows.*—The District Agricultural Exhibition was the main function which lasted for three weeks. Various sections were arranged by all Departments and about 20,000 people from all parts of the District took advantage. Besides this three Demonstrations on a fairly large scale were held and the improvements were brought to the notice of visitors.

72. *Control of jowar smut.*—With the help of Revenue Department 1,000 Sulphur packets were distributed in the season. It was observed that several cultivators were still using copper-sulphate from Local market.

73. *Cotton Boll-worm Control.*—Seven counters and one Agricultural Sub-Overseer were appointed from the funds of the Indian Central Cotton Committee. Intensive propaganda was conducted specially in Jambusar Taluka which is backward in this respect. Owing to lateness of cotton crop not more than 50 per cent. of the sticks were removed by about the middle of May in Jambusar while in the rest of the District 70 per cent. of the area was thus cleaned. In order to avoid the difficulty of supplying the plant-pullers in time all preparations were made to stock sufficient number in advance but the increase price kept back the farmers from purchasing same more particularly because of slump in cotton prices and unsatisfactory cotton crop. Only 76 iron handle and 381 wooden handle plant-pullers were thus supplied.

74. The Scheme for estimation of effects on cotton crop on account of the use of plant-pullers was financed by the Indian Central Cotton Committee and the work was carried out by one Agricultural Overseer and four counters. It was observed that the yield of cotton in case of pulled area (cleaned by up-rooting cotton stalks) was higher by 20 per cent. than that of adjoining un-pulled or un-clean area in Baroda State territory.

75. *Distribution of seeds, manures, etc.*—The following were distributed in the District during the year under report :—

B.D.8 Cotton seeds	192,000	lbs.
Wheat.....No. 224	800	,,
Lucerne	20	,,
Paddy	960	,,
Mango grafts	880	Nos.
Mosambi	306	,,
Plaintain suckers	100	,,
Other fruit plants	160	,,
San seed	16,120	lbs.

Sulphate of ammonia	..	..	5,200 lbs.
Castor-cake ..	..	..	2,880 ,,
Denatured salt ..	..	..	1,280 ,,
Sulphur packets ..	..	..	1,000 Nos.
Plant pullers ..	..	..	457 ,,

Surat District.

76. *Cotton seed multiplication and distribution.*—As pointed out in last year's report two Co-operative Cotton Sale Societies near Kim, viz., Mulad and Karanj were included in our seed area and controlled by the Department for making a larger seed stock available to meet heavy demands from the native States. Thus the area controlled during the year was 26,618 acres including 1,160 acres grown from Surat Farm pedigree seed. The total quantity of kapas ginned was 7,869 bhars giving 2,922 candies lint.

Surat Farm produced	..	..	14,016 lbs.
Seed purchased from groups	..	..	1,719,689 ,,
	Total	..	1,833,705 ,,

Out of the above stock 942,862 lbs. were supplied to Rajpipla and Chhota-Udepur States and the remaining quantity of 890,843 lbs. were distributed in the District by opening 23 seed depôts in the interior. Besides approximately 129,781 lbs. were supplied by Co-operative Cotton Sale Societies direct to their members and other buyers. Thus the total seed distribution of improved 1027 A.L.F. comes to 1,963,486 lbs. through the Department.

About 26 gallis (30,056 lbs.) of regenerated Surat I A seed has been supplied to Sonsak Co-operative Cotton Sale Society in Olpad as per policy newly laid down by Government and it is proposed to isolate the Taluka and stop further admixture by prohibiting all imports of cotton grown beyond Tapti to the South on account of the passing of the Cotton Control Act Goghari has no doubt been practically, eliminated but its place has been taken over by the spread of Surat 1 A seed which is available in large quantities with Co-operative Cotton Sale Societies and few interested merchants in the area lying South of the Tapti. This seriously affects the spread of 1027 A.L.F. throughout the tract. Unless therefore the Cotton Control Act of 1935 be amended so as to prohibit the growing and handling of any other cotton except 1027 A.L.F. in the area lying South of the Tapti river it is feared that in course of time the reputation of Surat cotton will be at stake.

77. *Jowar seed Budh Perio No.* 53.—In order to spread the improved variety of jowar rapidly in the District a scheme of supplying Farm seed at half concession rate to a selected cultivator in five villages in each of the four Talukas, viz., Olpad, Chorashi Bardoli and Jalalpur has been in operation since three years and will be continued for a total period of five years in order that the seed will naturally spread in the District during that period. Accordingly five new centres in each Taluka will be taken up next season thus covering the total number of 20 villages in each of the Talukas mentioned above. The quantity of fresh seed distrubuted to cultivators comes to 18,673 lbs. as against 16,659 lbs. during last year.

78. *Rice.*—The trial of K. 184 was taken up in a village near Bulsar and compared with the Local Kada variety. It fared well but had lodged at the time of maturing and was thus damaged. Both matured at the same time. From the results of past seasons it is observed that the strain does not perform uniformly.

79. *Wheat.*—The trial of Pusa 4 was continued at Talao-chora-bid and yielded on an average of 440 lbs. per acre as a dry crop from a field trial of 17 acres. This variety is free from rust. Similarly Pusa 52 was tried in a small plot and yielded 420 lbs. per acre.

80. *Sugarcane.*—Poj. 2878 and E. K. 28 were introduced in 1933–34 and regular tests are taken since 1934–35. During the year under report Poj. 2878 yielded 9,300 lbs. gul per acre while E. K. 28 gave 9,000 lbs. per acre. The average yield of gul for the last four seasons comes to 10,528 lbs. and 9,610 lbs. respectively per acre. These varieties have occupied about 30 acres round about Bulsar-Pardi, Chikhli and Amalsad. Co. 213 on account of its hardiness and less water requirement has covered nearly 70 per cent. of the area under cane in South Surat District. Trials of Co. 413, Co. 414 and Co. 421 were taken at Malvada village in Chikhli Taluka and yielded 5,120 lbs., 5,920 lbs. and 5,440 lbs. gul per acre respectively. Fresh cane seed of different varieties was tried at Mota-Vaghchhipa in Pardi Taluka but as it was imported late in the month of March and from a long distance the germination was very poor and the plots patchy. No comparative results are therefore available. The trial of Co. 290, Co. 413 and Co. 414 has been arranged for the next season and the results will be reported in due course of time.

81. *Distribution of manures.*—Sulphate of ammonia is mostly used as a top-dressing in sugarcane and to a small extent in rice. About 40 tons of it was used in this area. Besides 63,760 lbs. of denatured salt was supplied during the year.

82. *Distribution of seeds, plants, etc.*—

Sugarcane Poj. 2878	.. .. ..	30,000 Sets.
Grape fruit plants	.. .. ..	80 Nos.
Chikoo plants	.. .. ..	100 „
Power crushers	.. .. ..	2 „

Improved Poona type Pans with Storage pans	..	..	..	6 Nos.
Dust gun machines	..	..	..	40 „
Iron ploughs	..	..	..	2 „
Sulphur dust	..	..	..	32 Tons.

83. The Pardi Taluka Development Association deputed its Overseer to Wardha to receive training in Bee-keeping and on his return he has started Bee-keeping Industry by securing 4 Indian Bee Colonies.

84. *Boll-worm Control Scheme.*—This is the fifth year of the propaganda and 17 counters were appointed early in March for carrying out a wide spread campaign to bring home to cultivators the advantages of up-rooting cotton stalks immediately after the pickings are over. As in previous year the work was concentrated in three Talukas of Ankleshwar, Olpad and Chorashi where up-rooting is largely practised by farmers. In the remaining Talukas of the District only one counter was posted per Taluka to keep up the activities of the Department. As in Broach a large stock of plant-pullers was kept ready for timely supply but the sale this season was unsatisfactory due to higher price charged by the manufacturers. There were also other grounds, viz. the crop was not vigorous and the stalks were thin due to peculiar seasonal conditions. Besides the prices of cotton had gone down to bottom level and the yield being poor the cultivators were not in a happy mood to go in for the purchase of plant-pullers. However the total number of plant-pullers supplied were 955 which with the previous number made up 8,083 total pullers supplied by the Department in the area lying South of Narmada excluding those purchased direct by the people.

85. *Goghari Survey.*—This was the fourth season that a field to field survey was done with the help of 6 Kamgars specially appointed for the purpose. In all 88 villages were surveyed covering a total area of 27,365 acres and it is gratifying to note that the cultivation of inferior Goghari has been completely eliminated. However our inquiry further reveals that the place of Goghari has been taken over by Surat 1A. The difficulty is aggravated by the system of cotton marketing at Surat where the produce is sold by the name of the locality irrespective of the quality and the buyers do not give remunerative premiums for 1,027 A. L. F. in comparison with Surat 1A which yields and gins better than the former. The Kamgars were posted at different ginning factories after the survey work was over to inspect carts of kapas brought there for delivery. Thus the growers and merchants have been kept alive of the danger of prosecution with a view to prohibit the cultivation and handling of inferior cotton.

V—ORGANISATION.

86. *Divisional Board.*—Under the Chairmanship of the Deputy Director of Agriculture, two meetings of the Board were held. The members as before took a keen interest in the discussions of subjects, which were varied and required considerable thinking. Almost all of

them in spite of their personal engagements and busy days tried to attend the meetings and rendered very valuable services by a sincere co-operation.

87. *Taluka Development Associations.*—Two More Taluka Development Associations have been organised thus making the total number of 12 Associations in the Division. As a result of past propaganda several such Associations were organised and were ready to be registered under the Co-operative Societies' Act but unfortunately Government have decided not to register any more Associations in view of the fact that Better Farming Societies in a group of villages are proposed to be started as it is hoped that the latter will work better than Taluka Development Associations which cover a very large area comprising a Taluka.

88. The new Gujarati monthly magazine "Khedut, Kheti and Sahakar" continued its publication with the joint efforts of both Co-operative and Agricultural Departments. It is doing a very useful service in dessiminating information on important Agricultural and Co-operative subjects to the villagers. The Department has arranged to purchase 500 copies of this magazine for free distribution to leading cultivators in the Division.

VI—AGRICULTURAL SERVICE.

89. *Supply of Premium Bulls.*—More bulls have been supplied during the year either from the funds of His Excellency the Viceroy's Scheme or the Village Uplift grant subsidised by India Government. With the number supplied previously it makes the total number of 18 Cow-bulls and 8 Buffalo-bulls working in the Division. It is hoped that with the money thus made available continuously under a five years' plan in each District. There will be sufficient number of stud Bulls resulting in the improved stock of cattle which will stimulate people to undertake such improvements on themselves collectively as a village unit.

90. *Mechanical help.*—The Mechanical Assistant who was working under the Deputy Director of Agriculture has been placed under the Agricultural Engineer to Government of Bombay, Poona, for administrative purposes and the work done by him will be incorporated in the report of that Officer.

VII—EDUCATIONAL WORK.

91. The staff inspects and examines Agricultural Bias Classes and conducts Vernacular Final Examination with Agricultural Bias in all Districts of the Division.

VIII—PUBLICITY.

92. Good many members of the staff contributed articles to Khedut Kheti and Sahakar magazine published by the joint Committee representing interests of both Agricultural and Co-operative Departments at Surat. Besides advantage was taken of Local Newspapers in giving wider publicity of curtailing cotton area and substituting other food and fodder crops in view of slump in cotton prices. Advisability of growing better quality cotton and introducing Agricultural Improvements so as to increase the yield and reduce the cost of production so as to meet the catastrophy.

H. G. BALUCH,

Surat, the 1st August 1938. Deputy Director of Agriculture,
Gujarat, Surat.

Programme of work to be done under the Deputy Director of Agriculture, Gujarat, Surat, for the year 1938-39.

I—RESEARCH.

SURAT.

(a) Cotton.

1. Evolving a type that will spin higher than 1027 A.L.F. while maintaining its fibre qualities and as far as possible, having ginning percentage equal to that of IA Long Boll.

(*a*) By selection from the Local material.

(*b*) By selection from the crosses and back crosses.

(*c*) By selection from the Inter-specific crosses and back crosses.

2. Comparative randomised tests on a small scale of individual progenies from Local selections.

3. Comparative yield tests of 1027 A.L.F., B.D. 8, Segregate 8-1 and IA Long Boll.

4. Dibbling trial at 1½" depth using 3—4 seeds to economise selfed cotton seed.

5. Production of selfed seed of 1027 A.L.F., IA Long Boll, Segregate 8-1 and B.D. 8.

6. Selection at Shera (Hansot) for wilt resistance in 1027 A.L.F. and finding out of Sythesing a type having wilt resistance with fibre characters.

(b) Jowar.

1. Maintenance of types.

2. Production of selfed seeds of Budh Perio 53.

BROACH.

Cotton.

1. Study of crosses to combine wilt resistance and good fibre quality of B.D. 8 with possible high ginning from other cottons.

2. Yield trials of Segregates from B.D. 8 and N.S. 12.

3. Maintenance of fixed types.

4. Multiplication of B.D. 8 for pure seed supply in the District will be continued.

NADIAD.

(*a*) *Tobacco.*

1. Studies in raising seedlings.

2. Tobacco Breeding :—

(*a*) Keliu selections and replications.

3. Study of cigarette and Bidi tobacco economics.

4. Trial plots of Keliu S. 49 in the District.

5. Study of U. S. A..cigarette types fresh introductions.

6. Study of manuring for cigarette tobacco.

(*b*) *Bajri.*

1. Further purification and study of Bajri selections and maintenance of selections.

2. Study in single, triple and replication of selections and yield comparisons.

3. Multiplication of the seed type No. 207-10.

(*c*) *Castor.*

1. Selection work in S-20, S-40 will be continued.

2. Testing the yield of S-20, S-5, S-40, Local in 8 replications.

VIRAMGAM.

(*a*) *Cotton.*

1. Testing of 104 selections (representing families) from Wagad cotton in progeny row cultures.

2. Small scale replication tests of 10 promising Wagad types with Wagad 8 and Local Wagad as checks.

3. Study of selections made for earliness, Sympodial habit and good bearing with desirable economic characters.

4. Further selection and purification in 46 Hybrid selection.

5. Study of F_1 generation of the crosses of Wagad 8 with Indian and Russian herbaceums made for quality and earliness.

6. Comparative field tests of Segregates 4-1 and 7-1 (of Wagad 8 × 1027 A.L.F. cross) with the Standard Strain Wagad 8 and Local Wagad.

(*b*) *Jowar.*

1. Yield trials of two types of Chhasatio and two of Utavali with Local Chhasatio and Local Utavali.

2. Small scale yield tests of 4 additional selections of Chhasatio and 4 of Utavali.

3. Study of 31 Fresh selections of Chhasatio and 17 of Utavali in progeny row cultures.

SURAT FARM.

1. The experiments on manure, rotation, green manuring, cotton and jowar, Dhaincha green manure fallow will be continued.

2. Seed multiplication of 1027 A.L.F., B.D. 8 and Budh Perio 53 will also continue.

3. Guiding and supervising the work of cultivator tenants on the Farm.

4. Conducting the Gujarati Magazine "Khedut, Kheti and Sahakar".

Dairy.

Dairy will be closed down in this year.

BROACH FARM.

1. The Broach Farm is being closed, and work of wheat breeding will be closed.

2. The area will be leased out, jowar No. 8 and 14 will be maintained pure by selfing on the Farm by arrangement with the lessee.

DOHAD FARM.

1. Selection work in maize and ground-nut will be started during the year.

2. Multiplication of pure seeds of maize, Spanish peanut, gram, and Pusa 4 wheat, etc., will be done through cultivator tenants, for distribution in the Dohad and Jhalod Taluka.

II—PROPAGANDA.

Surat.

1. Control of seed multiplication 1027 A.L.F. at various gin group centres and distribution of the resultant seed in the Surat protected area lying South of Narmada.

2. Control of seed multiplication of Selection IA Long Boll in Olpad Taluka and distribution of resultant seed through Co-operative Cotton Sale Societies to be restricted to that Taluka only.

3. Spread of Budh Perio 53 jowar through registered seed growers and distribution of pure seed from Surat Farm.

4. Spread of clean up measure for controlling Cotton Boll-worm.

5. Watching for the strict enforcement of the Cotton Control Act.

6. Trial of sugarcane varieties Co. 213, Poj. 2878 and E.K. 28.

7. Trials of K. 184 with Local Kada and spread of K. 184 in the District.

8. Propaganda of sulphur dusting on mango trees and advocating use of manures on fruit trees, Rice and Sugarcane.

9. Conducting the work of the demonstration centres in the District.

10. Conducting Crop Experiments in Water-logged areas of Olpad Taluka.

Broach.

1. Control of seed multiplication of B.D. 8 at various gin centres and distribution of the resultant seed in the Broach District.

2. Advocating san green manuring in fallow lands and supply of seeds.

3. Spread of clean-up measures for controlling Boll-worm.

4. Spread of Wheat No. 224 and jowar No. 8.

5. Extension of ground-nut as a good rotational crop.

6. Distribution of sulphur dust packets for treatment against smut on jowar.

7. To start and formulate the rules, etc., of the Cotton Markets at Broach.

8. Conducting the work of the Demonstration Centre.

9. Extension of practice of the threshing wheat by improved wheat thresher.

KAIRA.

1. Seed distribution of Gandiu No. 6, Wheat No. 224, Pusa 4 and Groundnut Magadi variety, Bajri and Castors.

2. Trials of wider sowing in cereals and Groundnut.

3. Varietal trials of Wheat, Bajri, Castors, Groundnut, Rice and Tobacco.

4. Sulphur dusting against Jiru Mildew.

5. Horticultural advice to cultivators regarding method of cultivation and manuring on fruit trees, etc.

6. Conducting the work of the Demonstration Centres in the District.

7. Helping Taluka Development Associations and Village Uplift Organizations.

8. Propaganda for the introduction of Buffalo-bulls in the District to improve the existing breed of buffaloes.

PANCH MAHALS.

1. Trials on cultivators' fields for cultural, varietal and manurial treatments will be carried out.

2. Spread of Co. 290 sugarcane and K. 540 paddy will be advocated.

3. Conducting the work of the Demonstration Centre.

4. Application of Sulphate of Ammonia for Rice and Sugarcane will be extended.

5. Seed distribution of Maize, Spanish Peanut, Gram, Pusa 4 Wheat through Co-operative Societies will be attended and its purity will be watched.

6. To conduct the Village Uplift Scheme and watch the progress of Premium bulls.

AHMEDABAD.

1. Trials of Wagad 4–1 and 7–1, Bajri 207, Castor S-20, Paddy K. 540 and Groundnut varieties will be carried out.

2. Extension of Wagad 8, Wheat No. 224 and Pusa 52 and 808 will be advocated.

3. Dibbling in Cotton and Groundnuts and wider sowing of cotton and wheat will be extended.

4. Extension of fruit cultivation and use of artificial manures on fruit trees.

5. Conducting the work of the Demonstration Centres in the District.

6. Rural Uplift work for general agricultural improvement in the area.

7. Extension of light iron ploughs in the paddy area of the District.

H. G. BALUCH,
Deputy Director of Agriculture,
Gujarat, Surat.

Surat, the 1st August 1938.

APPENDIX G.

Summary of Work done under the Professor of Agriculture, Agricultural College, Poona, for the year 1937–38.

1. *Charge.*—Mr. V. G. Gokhale continued as Professor of Agriculture until 10th March 1938 the date of his retirement. Mr. B. S. Patel was Professor of Agriculture from the 10th March 1938 to 24th May 1938 from which date Rao Bahadur V. A. Tamhane took over these duties.

2. *Staff.*—Mr. H. G. Baluch, Assistant Professor of Dairying and Animal Husbandry, and Manager, Agricultural College Dairy, Kirkee, having been appointed to officiate as Deputy Director of Agriculture, Gujarat, Surat, left for Surat on 20th May 1938. The charge of his office was held from 20th May 1938 to 25th May 1938 by Mr. K. S. Kulkarny, Assistant Professor of Agriculture, and from 26th May 1938 to 20th June 1938 by Rao Bahadur V. A. Tamhane, Professor of Agriculture. Mr. M. M. Desai took over these duties from 20th June 1938. Mr. A. R. Neginhal, Superintendent, College farm and 1st Lecturer in Agriculture, was transferred to the Southern Division and Mr. H. B. Kulkarni from Dharwar has taken his place from the 7th June 1938.

3. *Lines of work.*—These remained the same as in the previous year.

A. Teaching.

4. The following shows the results of the University Examination in the subject of Agriculture :—

Examination.	Number of students appeared.	Number of students passed.	Percentage, 1936–37.	Percentage, 1937–38.
First year in Science ..	56	54	75·8	96·4
Second year in Science ..	59	57	95·5	96·7
B.Sc.	82	56	71·4	68·3

The F.Sc. class this year was rather a very average one as ascertained from the results.

The difficulty of handling large batches, each of 25–27 students of the First Year class, with the help of the present staff and a small number of bullocks available continued during the year under report. The efficiency, therefore, suffered considerably.

The teaching of " Soils ", which was done by the Agricultural Section during the last 18 years, was handed over to the Chemistry section as

a result of the decisions at a meeting of the Heads of Sections, from the second term of the year under report. This has, however, resulted in relieving the farm staff to a certain extent thus to give a little more but badly needed attention to the conduct of this large farm.

Special courses.—Fifteen students underwent the practical course in Animal Husbandry and Dairying, their period of training varying from one to twelve weeks. The demand for this course was persistent during the whole year. Only one student that joined in December left without notice in a week's time whereas the rest completed their agreed periods satisfactorily. Two students have just recently joined this course.

Up to the time of reporting seven students have joined the special practical course in Crop Production which started this year on the College farm. Of these three are from Kashmir, one from Kathiawad and the rest from the Deccan. One student from Gujarat underwent a short practical course in vegetable growing during the year under report.

It is encouraging to find that the demand for such training is increasing.

In September 1937 practical demonstrations of implements and dairying and lectures on Agricultural and Cattle-breeding topics were carried out for the special training course for Assistant and Deputy Collectors.

Two batches of students from the Special Co-operative Officers' class were also given practical demonstrations in implements, dairying and lectures on soils and farm crops.

During October 1937, 5 lectures on raising of better crops and 5 demonstrations of implements and farm crops were delivered in *Urdu* by Mr. K. S. Kulkarny, while Mr. H. G. Baluch delivered 5 lectures on "Live-stock Raising and Management" and gave 5 demonstrations on Dairying work, to batches of sepoys and N.C.Os. from the different Indian Regiments in Poona under the Scheme of Rural Reconstruction in the Army. The lectures had to be delivered in the different regimental areas in Poona, Kirkee and Ghorpuri, etc.

5. *College farm.*—This institution, primarily maintained for practical agricultural instruction of the College students, also afforded land and labour facilities to the different sections of the College for their field research work. About ten acres of land are at the time of reporting at the disposal of the different sections. The farm maintained a growing crops museum both in the *kharif* as well as the *rabi* season for the College students. This museum was taken full advantage of by scores of students from a few schools as also the male Training College in Poona. The Conductors of these institutions expressed their gratefulness for this help they received. The museum of a large variety of old and modern bullock-worked agricultural implements continued to be maintained.

(*a*) *The season.*—The total rainfall in the 12 months from January 1937 was 30·38 inches as against 15·22 inches of the previous year and 27·13 inches which is the annual normal. The anti-monsoon showers in April 1938 helped to a certain extent the preparation of land. The regular monsoon started on the 11th of June, giving a total of nearly 6 inches for this month thus helping to finish sowings of all *Kharif* crops in time. July registered another 5·84 inches where as August though drizzly during a large portion gave only 1·16 inches causing most crops in full sowing to receive a certain amount of check, the direct sufferers being Cotton, groundnut, fodder jowars to a marked extent. September allowed this state to continue until about the middle when in its latter half very opportune rains were received to relieve the whole anxious situation.

This heavy and continuous rain of over 11 inches in the latter half of September and over two inches in October, however, caused varying amount of damage to a number of crops. On large areas jowar fodder was lodged to the ground, *bajri* grain was found to germinate on the heads, tomatoes were heavily spoiled, chillies, potatoes, soya beans, early groundnuts, etc., suffered from over wet soil. There was no rain from November onwards, except for a light shower in mid December. The *rabi* dry crops fared quite well. The per acre outturns of a few important crops are noted below :—

	Name of crop.	Outturn per acre.
1.	*Bajri* and *Tur* mixture—	
	Bajri	1,797 lbs. grain.
	Tur	636 do.
2.	Groundnuts—	
	Spanish peanuts	1,019 lbs. pods.
	Big Japan	1,993 lbs. pods.
3.	Chillies (dry crops)	812 lbs. dry pods.
4.	*Shalu jowar*	2,730 lbs. grain.
5.	Linseed	978 lbs. grain.
6.	Broach Cotton (1027 A. L. F.)	1,186 lbs. Kapas.
7.	Wheat No. 808	1,008 lbs. grain.
8.	Wheat Pusa 4 (Partly irrigated)	1,783 lbs. grain.
9.	Tobacco	998 lbs. Dry *Jarda*.
10.	Sugarcane	10,824 lbs. *gul*.
11.	Sweet potatoes	8,113 lbs. tubers.
12.	Onion	29,351 lbs. bulbs.
13.	Garlic	4,710 lbs. bulbs.
14.	*Suran*	32,720 lbs. Corms.
15.	Double beans	8,440 lbs. pods.

B. Research and Investigation.

6. *Relation of humus in the use of sulphate of ammonia.*—Banilla cotton was grown this year. The results show that sulphate of ammonia *plus* farm yard manure gives significantly superior yields to no manure. The other treatment did not show any significant difference.

7. *Position of a legume and oil seed in rotation with a cereal.*—The treatments during the year were (*a*) *bajri* after *bajri* (*b*) *bajri* after *kulthi*, (*c*) *bajri* after sesamum and (*d*) *bajri* and *tur* as a line mixture as done in the Deccan. There results sow that :—

(*i*) *bajri* after *kulthi* gives significantly higher yield than after *bajri* confirming the previous 4 out of 7 years' results. Only in 3 years these two treatments have been equal to each other.

(*ii*) *bajri* and *tur* mixture stands superior to all other treatments as it did since the start of this treatment.

(*iii*) *bajri* after sesamum also stands superior to *bajri* after *kulthi* and *bajri* after *bajri*.

Taking the last two years of the rotation these treatments stand in the following order when the money value is considered :—

	Gross value in Rs. a. p.
1. *Bajri* and *tur* mixture	90 3 0
2. *Bajri* after sesamum	39 1 6
3. *Bajri* after *kulthi*	34 11 3
4. *Bajri* after *bajri*	31 5 0

Taking all the previous years during which this experiment has been carried out the financial aspect shown is as under :—

	Gross value. Rs. a. p.
1. *Bajri* and *Tur* mixture (4 years only) ..	88 9 9
2. *Bajri* after Sesamum (4 years only) ..	41 2 6
3. *Bajri* after *bajri*	32 14 9
4. *Bajri* after *kulthi*	29 4 9

8. *Manurial requirements of brinjals.*—During the last 4 (four) years the study on this crop showed Nitrogen to be the ruling element. During the year under report different quantities of nitrogen, viz., 60 lbs., 80 lbs., and 120 lbs. per acre over and above 20 carts of farm yard manure were sought to be compared. The results however, do not show any treatment significantly superior to any other.

9. *Effective rotting of sann hemp green manure.*—The Director of Agriculture, suggested an experiment to study the effect of adding of farm yard manure at the time of burying on the rotting of the green manured crop and the consequent increase in the outturn of the following crops. There were 4 treatments, viz. (*i*) Farm yard manure only (*ii*) farm yard manure plus green manure (*iii*) green manure only and (*iv*) no manure. The green manuring was done at the usual time and in the plots where farm yard manure was to be given. It was done at 20 carts per acre in the areas where garlic was grown in the winter and 10 carts per acre where tobacco was grown as a dry crop.

The soil samples sent for chemical analysis 3 weeks and 6 weeks after green manuring showed no regular marked differences in the quantities of ammonical nitrogen between the green manuring only and green manuring with farm yard manure.

As regards the performance of the crops grown in winter the following results are noted :—

(*a*) *Garlic.*—Farm yard manure plus green manure gave significant results over green manure only but not over farm yard manure. The no manure plots gave the least yield.

(*b*) *Tobacco.*—Owing to sudden, heavy and continuous rainfall soon after transplanting in September the whole area suffered very considerably due to washing and covering down of plants. The gaps were, however filled in later. But the above has caused serious vitiation in this year's experiment. The results worked out do not show any treatment superior to any other treatment. These results, however, need to be discarded due to the above serious vitiation.

10. *Effect of different kinds of preparatory tillage with and without manure on dry crops in the Deccan.*—In the case of N. R. Cotton the outturns of seed cotton show that manuring is significantly superior to no manuring both when the field is only harrowed or plowed. But preparing the land by plowing did not show any advantage over preparing the land by harrowings only. So also there was no difference between fields which were harrowed and manured or plowed and manured.

As regards grain jowar the crop it grew extremely well so far as vegetation was concerned. But the whole crop did not give any seed at all. Attempts were made to trace the possible cause of this phenemonon which was the first in the history of this farm. No satisfactory explanation could be found but is being investigated. The fodder outturns show that manuring is significantly superior to no manuring both when the field is only harrowed or plowed. Plowing the land gives significantly superior result to that detained by only harrowing. But there is no difference between fields which are harrowed and manured or plowed and manured.

11. *Trial of Soya beans.*—20 varieties of soya beans brought from the United States of America were sent for trial by the Economic Botanist to the Government, Bombay Presidency, Poona, in 1936–37. The seed of all these was multiplied for larger scale trial during the year under report. There were eleven other Indian varieties tried in addition to those which we had on the College farm. All the United States of America varieties were very early (80–90 days) and grew very meagerly giving calculated yields varying from 13 to 90 lbs. per acre except *Otootan* which is a fortnight late, has black seeds and yielded 330 lbs. per acre.

The eleven Indian types took 100–120 days and gave outturns varying from 450 to 900 lbs. per acre. The farm stocks yielded from 500 to 1100 lbs. per acre and took 100–120 days.

12. *Development of higher milk yield in cows and buffaloes along with early maturity and regular calving.*—The programme laid out in 1929 was continued.

In the line of cows under out-crossing with *Tulip* bull, the superiority of his daughter and other dams is established only to the extent of 22 per cent. The record of one more Tupli's daughter which freshened only this year, is yet too short for drawing any conclusion. Bull Tulip however died on 3rd November 1937.

As regards out crossing with Bull *Silver Jubilee* who gave 8 services, during the year, three calves born during the year showed no outward resemblances. Of the 4 male calves born during the year out of his last year's 8 services all resemble the bull in outward appearances.

In the line breeding policy 4 freshly calved daughters are in milk but their record is yet too short for any conclusions to be drawn.

In the line of Surti buffaloes, two inbred daughters of *Bhagi* with her son *Dairy butter*, showed the following performances. *Bhagttar* No. 114 calved for the fourth time on 3rd February 1938. From her first calving to end of March 1938, i.e., in 1606 days she has yielded in all 19,339 lbs. of milk as against 18,709 lbs. of her dam for the same period, viz. 1,446 days. This means a daily average of 12·04 for *Bhagttar* and 12·93 for Bhagi, putting the daughter about 7 per cent. below her mother. This is perhaps due to the daughter having calved first time earlier than her mother by about one year and four months.

Bhagttar II (No. 128), the second daughter, calved for the first time on 13th September 1,936 and is still in milk, having yielded 4,931 lbs. of milk in 565 days up to 31st March 1938 as against 7,107 lbs. of milk in 553 days of her mother *Bhagi*. She is under observation for further performance.

As regards line breeding there were in all 19 animals in milk—5 from the *Bhagirathi* line and 14 from the *Sajani* line. The results, on the whole, show the lines to be superior to their dams. The inbreeding of *Bhagirathi*

line is discontinued due to the bull having died on 30th November 1937 at an age of about 12 years and 6 months.

13. *Maintenance of steady milk supply in Deccan conditions.*—This was discontinued during the year as it was found last year that skipping earlier heats from being covered to provide a regular number of calvings from month to month was of no avail.

C. Commercial working of the College Dairy.

14. The year began with 267 heads of cattle and ended with 264 as against 228 and 267 respectively last year. Foot and mouth disease broke out during February and March 1938.

15. The average yield of cows and buffaloes stood at 3,046 lbs. and 3,318 lbs. as against 3,134 lbs. and 3,455 lbs. of last year. The decrease in yield is mainly due to poorer performance of new calvers and the outbreak of "foot and mouth" disease. The cost of production of 100 lbs. of milk came to Rs. 15·44 as against Rs. 15·3 of last year whereas the realization for an equal quantity of milk came to Rs. 12·1 as against Rs. 11·89 of last year. Both these are about constant.

16. The total area under fodder crops was 209 acres and 28 gunthas as against 239 acres and 7 gunthas of last year. 49 acres and 13 gunthas were cropped more than once as against 89·1 acres of last year. The decrease is mainly due to lesser necessity of intensive cropping due to a more favourable season.

17. Production costs per 100 lbs. of green fodder worked out Re. 0–6–4·5 as against Re. 0–8–0 of last year, due to higher yields and less irrigation charges on account of better season. Total green fodder produced was 3,571,254 lbs. as against 3,224,000 lbs. of last year.

18. The grazing on 38 acres furnished enough forage equivalent to full requirements of 36·42 adult animals for 122 days as against 11·97 adults for an equal period last year. This increase is due to a better season.

D. Aid and Assistance to the Public.

19. *Help to different sections at the College.*—The College-farm provided about 10 acres of land to various sections of the College as also the Agricultural Meteorologist for their research work. All other possible help was also given.

20. *Visitors.*—The number of visitors to the College farm and the College Dairy during the year was yet more than last year. Among the prominent visitors ought to be mentioned the Honourable Mr. Morarji Desai, Minister for Agriculture of this province, Messrs. Russel and Gough, Members of the Progress group of the Bombay Legislative Assembly who made a very detailed tour of study, Mr. A. G. Beattie,

Director of Agriculture, Nigeria, Mr. J. D. Tothill, Director of Agriculture, Uganda.

21. *Enquiries.*—About an equal number of enquiries as last year on all kinds of subjects pertaining to different aspects of crop-growing, Dairing and Animal Husbandry were dealt with during the year.

22. *Bull services.*—The College Dairy offered during the year bull services to 34 cows and 17 buffaloes of the public.

23. *Publications.*—Mr. C. N. Dave, sent the following publications :—

(1) Sindhi breed of cows in the Agricultural College Magazine, Vol. XXIX, No. 3, December 1937.

(2) Investigation into the incorporation of foam in milk by city *Gavalies*—Same magazine February 1938.

24. *Efforts to suppress corruption.*—Every possible effort was made to prevent corruption in the College Farm as also the College Dairy by regular as also surprise checks by the Professor of Agriculture and his Assistants. Supplies were made to the public as well as to Government Officers at the same rates.

V. A. TAMHANE,
Professor of Agriculture.

Summary of publications by Mr. C. N. Dave.

Publication No. 1.

(*i*) The average live-weight of a sindhi cow is 752 lbs., that of a bull is 1,167 lbs. and a calf at birth about 43 lbs.

(*ii*) The average gestation period in cows is about 283·68 days, a male calf being carried about 2·21 days longer than a female calf.

(*iii*) Average age at first calving works at about 3 years and 52 days.

(*iv*) The average fat in milk works out at about 5·61 per cent.

Publication No. 2.

(*i*) About 92 per cent. of the foam is found in the milk immediately after milking.

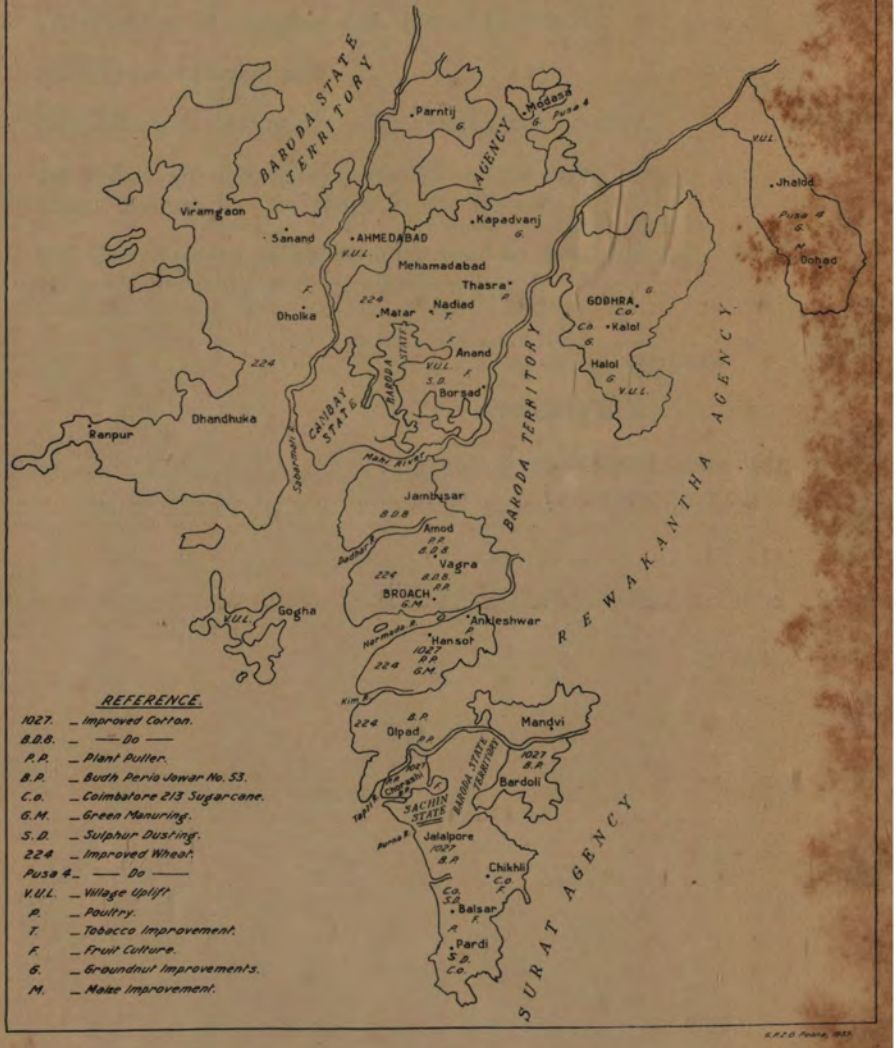
(*ii*) When a *gavali* measures out such milk to customers, it would contain about 12 per cent. of it as foam.

(*iii*) Almost the whole foam disappears if milk is kept for about 5 minutes or passed through a cloth before measuring it out.

(*iv*) On an average, milk is drawn out of the cow at 1 lb. 2 ozs. per minute.

V. A. TAMHANE,
Professor of Agriculture.

A MAP OF GUJARAT DIVISION
SHOWING AGRICULTURAL IMPROVEMENTS.
1937 - 38



REFERENCE.

1027.	Improved Cotton.
B.D.B.	— Do —
P.P.	Plant Puller.
B.P.	Budh Perio Jowar No. 53.
C.o.	Coimbatore 213 Sugarcane.
G.M.	Green Manuring.
S.D.	Sulphur Dusting.
224	Improved Wheat.
Pusa 4	— Do —
V.U.L.	Village Uplift
P.	Poultry.
T.	Tobacco Improvement.
F.	Fruit Culture.
G.	Groundnut Improvements.
M.	Maize Improvement.

C.P.C.O. Poona, 1938.

Programme of Work for 1938-39.

I. Teaching.

This will be carried out as per syllabus.

II. Research.

The following items will be worked during the year :—

(*i*) Relation of humus in the use of Sulphate of Ammonia.

(*ii*) Position of a legume and oil seed in rotation with a cereal.

(*iii*) Trial of Soyabeans.

(*iv*) Effective rotting of Samm-hemp green-manure.

(*v*) Effect of different kinds of preparatory tillage with and without manure for dry crops in the Deccan.

(*vi*) Development of higher milk yield in cows and buffaloes along with early maturity and regular calving.

V. A. TAMHANE,
Professor of Agriculture.

APPENDIX H.

Summary of Work done under the Agricultural Chemist to Government, Bombay Province, Poona, during the year 1937-38.

I held charge of the office and laboratories of the Agricultural Chemist throughout the year except for a period of one month and one day from 8th May to 9th June 1938 when I was on leave on average pay. During my absence on leave Mr. N. Narayana, Assistant Professor of Chemistry, held charge of the office of the Agricultural Chemist in addition to his own duties.

Teaching.—The teaching of the undergraduate students at the Poona Agricultural College took a considerable amount of time of the staff of the Agricultural Chemist. Both the Assistant Professor Mr. N. Narayana and the Lecturer Mr. V. S. Abhyankar worked very indefatigably in the discharge of their duties, many times at very great inconvenience to themselves to cope up with the additional teaching that devolved upon this Section during the year under report.

Three new students joined the laboratory for post-graduate work. One of them left almost immediately as he secured a job elsewhere. The other two together with two more students of the previous year worked throughout the year.

Analytical and Advisory.—The number of samples received for analysis was a little more than 600. Samples from departmental farms and from other Government departments formed the largest quota as usual as shown under :—

Name of sample.	Government samples.	Private samples.
Soils	220	4
Waters	23	6
Manures	27	9
Dairy products	22	7
Fruits	50	..
Seeds and grains	63	4
Foods and feeding-stuffs	44	1
Gul	10	3
Miscellaneous	116	2
Total ..	575	36

A large number of soil samples for nitrogen determination was received this year from the Agricultural Meteorologist, Poona, in connection with

some of the experiments carried on by him. The College Farm sent eighteen samples for nitrogen determination in connection with a green-manuring experiment carried on at that farm. Fourteen samples were received from Surat farm where a similar experiment is being carried out. Twelve samples were analysed for the Plant Pathologist to Government, Bombay, Poona, in connection with his studies on the fixation of nitrogen in rice soil at Karjat. A number of soil samples was received for analysis from the various District Agricultural Overseers which they had collected from the cultivators' fields. Three samples were received from outside the Bombay Province, one from New Zealand, one from Japan and one from Kutch State. One sample of soil from a private gentleman was analysed free of charge under Government Resolution, General Department, No. 9101, dated 17th November 1937.

Among the manures analysed for the public six samples were sent by the manure manufacturing firms and three by private farms. One sample of compost made from city refuse sent by a firm in Bombay was found on analysis to be rather poor in nature.

The dairy products included three samples of casein prepared by a firm near Anand. The analysis showed that the samples were fairly good. Nine samples of cream were analysed for the Imperial Dairy Expert in connection with his study on the flavour of butter made from Sindhi cow and Jersey cow milk. Four samples were analysed for the Agricultural College Dairy, Kirkee. Two samples of ghee brought from a bazar shop from one and the same tin, one of liquid ghee from the top and the other of solid ghee from the bottom of the tin, showed that the upper liquid ghee contained more of the characteristic ghee fats than the lower solid ghee.

Forty-four samples of banana were analysed for the Horticulturist to Government, Bombay, Poona, in connection with a manurial experiment carried on by him. Four samples of pineapple of the Kew and Queen variety grown at Kumta farm were analysed for the Superintendent, Kumta Farm.

Three samples of Gul prepared from toddy by the All-India Village Industries Association at Vile Parle and at Hosur were analysed free of charge under Government Resolution, General Department, No. 9101, dated 17th November 1937.

Seventeen samples of wheat grain obtained from the Bijapur market were analysed for the Imperial Council of Agricultural Research. The Economic Botanist, Poona, sent eighteen samples of safflower seed for determining their oil contents. Eight samples of jowar grain were received from the Superintendent, Mohol Farm, to determine their food value. The Superintendent, Kumta Farm, sent thirteen samples of different strains of rice for the determination of their food value. Two samples of Mohwa seed supposed to be damaged in transit were sent by the G. I. P. Railway to determine the nature of damage.

Seven samples of various straws were sent by the Veterinary Inspector, Bombay, for determining their food value including the mineral matter. Thirty-six samples of various feeding-stuffs were analysed for the Live Stock Expert to Government, Bombay, Poona.

Amongst miscellaneous samples seventy-seven samples of culture solutions were analysed in connection with a joint study on the fixation of nitrogen by rice plants with the Plant Pathology section. Two samples of honey and one of soap were analysed free of charge for the All-India Village Industries Association.

Research.—The study of the changes taking place during the ripening of bananas and mangoes was concluded during the year under report. The investigation on the intake and flow-back of nutrients of crops was modified slightly and was restricted to the intake of nutrients only. Two crops, wheat and sann-hemp, were selected for the study. Periodical determinations of the intake of the various mineral constituents like iron, aluminium, calcium, magnesium, sodium, potassium, copper, etc., were made right from the stage of germination up to the stage of final maturing. Along with this a study of the metabolic activity of the plant as regards its protein and carbohydrate contents was also made.

The work on the proteins of *bajri* could not be written up due to the other engagements of the workers.

A study of the physico-chemical properties of some important soil types of the Province was started. In this connection a few samples were analysed for some of their physical and chemical constants. A few trials made to take soil monoliths proved unsuccessful. Investigations into the photo-chemical theory as regards nitrogen-fixation in soils could not be taken up this year. A beginning has been made to study the use of molasses as an aid to soil fertility.

Publications.—Three papers were published during the year.

1. A note on the characteristics of the oils from the seeds of the Indian and Australian varieties of sandal wood trees; by W. V. Kotasthane and N. Narayana; Poona Agricultural College Magazine (1938), Vol. 29, page 126.

2. A comparison of the oils from the local and Spanish varieties of ground-nut; by W. V. Kotasthane and N. Narayana; Journal of the University of Bombay (1937), Vol. 6, page 143.

3. The proteins of groundnut; by W. V. Kotasthane and N. Narayana; Proceedings of the Indian Academy of Sciences (1937), Vol. 6, Section B, page 376.

General.—This section was represented at two shows during the year. A stall called the Soils and Fertilisers Court was put up at the Karnatak Agricultural Show, Belgaum. The items of compost making and bone charring and powdering attracted the attention of the cultivators

particularly. Help was given to the different sections at the Industrial Exhibition at Poona in demonstrating such items as preparation of essential oils, detection of adulteration of milk and other dairy products, etc.

Staff.—Mr. N. R. Gurjar, junior assistant, was on leave on medical certificate from 6th April to 18th May 1938. Mr. D. M. Ranade, senior assistant, was on leave on medical certificate from 26th April to 25th June 1938. Mr. D. S. Shrikant was appointed as a temporary substitute in his place.

I am happy to say that there were no cases of corruption in my section during the year under report.

Programme of Work for 1938-39.

I. *Studies to be continued from previous year—*

1. The intake of nutrients of a few typical crops.
2. The study of the physico-chemical properties of soil types.
3. The use of molasses as an aid to soil fertility.

II. *New items for study—*

Investigations into the photo-chemical theory as regards nitrogen fixation in soils.

J. A. DAJI,
Agricultural Chemist to Government,
Bombay Province, Poona.

A note on the characteristics of the oils from the seeds of the Indian and Australian varieties of sandal wood trees,—by W. V. Kotasthane and N. Narayana.

Poona Agricultural College Magazine (1938), Vol. 29, page 126.

The characteristics of ether extracted oils of the seeds of the Mysore sandal-wood trees (Santalum album) and the Australian sandal-wood tree (Eucarya spicata) have been determined.

Both belong to the class of drying oil.

The Indian oil contains a resin which is insoluble in acetone and can thus be separated. The higher iodine and thiocyanogen values and lower acetyl value are characteristic of the Indian oil. On separating the solid acids by the lead-ether method, the Indian oil yields 50 per cent. and the Australian oil 6·86 per cent. of solid acid. But in both cases however the iodine values of the solid acid remain as high as the original oils. Both oils dissolve sulphur on heating and thus belong to the class of vulcanising oils. Both dissolve resins and yield good varnishes.

"A comparison of the oils from the local and Spanish varieties of Ground-nut—" by W. V. Kotasthane and N. Narayana.

Journal of the University of Bombay (1937), Vol. 6, page 143.

Oils from the Spanish and local varieties of ground-nut (Arachis hypogaea) have been compared. The main differences are the higher acetyl and iodine values of the oil from the local variety. The percentage of unsaturated acid in the local oil is nearly one and a half times that in the Spanish oil. The characteristic fatty acid of ground-nut oil—arachidic acid—is less in the local, nearly half of that in the Spanish oil. Stearic acid in local oil is double and linoleic acid one and a half times their content in the Spanish oil.

" The Proteins of Ground-nut "—by W. V. Kotasthane and N. Narayana.

Proceedings of the Indian Academy of Science (1937), Vol. 6, Section B, page 376.

Two globulins from each of the two important Indian grown varieties of ground-nut—Spanish and local—have been isolated and analysed. No differences have been noticed in the composition of the proteins of the two varieties. The essential amino-acid make up of the total proteins of ground-nut have been compared with that of the total proteins of Soyabean. Ground-nut proteins are shown to be in no way inferior to those of Soyabean. A plea is therefore made for a better and fuller use of ground-nut cake in the dietary of the people. Ground-nut cake is available in the country in plenty.

APPENDIX I.

Summary of Work done under the Economic Botanist to the Government, Bombay Province, Poona, for the year 1937–1938.

Professor L. S. S. Kumar held charge of the section throughout the year except for the period he was on deputation to attend the Fourth International Grassland Congress from 15th June 1937 to 4th August 1937, followed by leave on average pay from 5th August 1937 to 18th September 1937. Professor Kumar was deputed to attend the Congress by the Imperial Council of Agricultural Research with the consent of the Bombay Government and the cost of deputation was borne by the Imperial Council of Agricultural Research. The Congress which included tours and paper reading session, lasted for a fortnight. The tour included visits to several counties in the middle of England and covered parts of Wales and Scotland. The delegates had opportunity to see the different types of grasslands found in British Isles and the Experimental Farms where improvement by way of grass-breeding and grassland management were in progress. A report of the Congress with suggestions for organisation of grassland investigations in India has been submitted to the Imperial Council of Agricultural Research.

Mr. V. M. Chavan and Mr. S. R. Godbole continued to work as Assistant Professor of Botany and Assistant Economic Botanist respectively except for the period of absence of Professor Kumar when Mr. Chavan officiated as Economic Botanist to Government, Bombay Province, Poona, and Mr. Godbole as Assistant Professor of Botany.

Mr. W. V. Joshi continued to work as Demonstrator in Botany.

Mr. N. M. Patel was in charge of the linseed breeding work till 22nd May 1938, and Mr. R. D. Gaitonde took charge of the work after Mr. Patel left for the United States of America for advanced studies in plant breeding.

Teaching.

The Economic Botanist was assisted by the Assistant Professor of Botany and Demonstrator in Botany to carry on the teaching work satisfactorily. Two post-graduate students have been admitted to the section. One of them is engaged in Cyto-genetic work and the other in Inter-specific hybridization of cotton.

Grass Research.

Grazing Experiments.—The rotational grazing experiment was continued for a further period of one year. The experiment started on 16th of August 1937 and closed on 28th February 1938. The rainfall for the season was highly satisfactory and the growth of vegetation was the best, ever since the experiment was started in 1931. At the end of the experiment it was observed that there was surplus grass available for grazing.

Live-weight of animals.—No live-weights were taken since the results of previous years have consistantly shown a correlation between increase in live-weight with the green and decrease with the dry condition of the grass vegetation. Further repetition of these trials was found unnecessary.

Grass yield.—The weight of grass cut from 20 random quadrats 10′×10′ from each of the four blocks indicates that in spite of the set-back of previous year owing to total failure of rain there is perceptible increase in yield of the Kuran as a whole.

Study of Andropogon contortus.—Areas of Spear grass marked in previous years have further indicated that better tussock grasses are definitely ousting the Spear grass.

Land development.—New bunds were not constructed during the year. Walls of silted bunds were increased in height.

Effect of different treatment on Aristida funiculata.—Two large plots measuring 100′×100′ each were selected in a place dominated by *A. funiculata*—a poor type of Spear grass. One of the plots was burnt and the other ploughed with a light plough to a depth of two to three inches in order to observe the effect on the extermination of this poor grass.

Acclimatization of Australian grasses.—Out of more than a dozen species of grasses obtained from Australia about six have been gradually acclimatized to grow and seed under Poona conditions. These grasses which showed poor growth the previous year on account of severe drought have again grown well. Seeds of these grasses have been collected and supplied to Live Stock Expert to the Government of Bombay, Poona, for trial in other parts of the Province.

Striga Research.

From the previous years selections of the "Bilichigan" variety of *jowar* plants No. 221 and 234 were chosen from the culture P 3—15—6 for further selection of Striga-resistant plants. Among the new *Jowar* varieties tested "Muddinandyal" showed promise of yielding resistant types. 600 progenies of each of the three selected plants were cultured and the resistant plants obtained from each were 518, 511 and 489 respectively. A large number of these were finally transplanted in pots and in the field to obtain seeds. Unfortunately a very severe and unexpected attack of *jowar* stem-borer resulted in the loss of a great majority of the resistant plants and only 16 plants from Bilichigan P 3—15—6—221, 6 from Bilichigan P 3—15—6—234 and 2 from muddinandyal, 22 were saved.

Varietal trial for susceptibility.—Four plants each of 14 local varieties of *jowar* and 10 African Sorghums were grown in the field to test their susceptibility to the three species of *Striga.* (*S. lutea, S. densiflora,* and *S. euphrasioides.*) In this trial it was observed that *S. lutea* and *S. densiflora* were each found to attack a plant of African Sorghum (R 27), the other varieties being not attacked. It is proposed to repeat this

again for another season or two before any conclusions are drawn. In another trial on light soil with only " maldandi " variety of *jowar* being used it was observed that out of a total of 34 plants cultured, 11 were attacked by *S. lutea* and 8 by *S. densiflora* while *S. euphrasioides* had attacked none. This is the first instance when successful germination of *S. densiflora* has been obtained during the past few years' trials. Whether *S. densiflora's* attack is conditioned by the nature of the soil is yet to be determined.

Orobanche Research.

300 pots of the following selections Poona Adcock 2—3—4—8—198, Harison Special 9—5—1—45 and G-6, 10—8—1—100 were tested for resistance to *Orobanche.* Out of these only six resistant plants from Harison Special and 1 from G.-6 were obtained.

As reported previously it would be necessary to grow the progeny on a very large scale in order to speed up this work. In the coming year an effort will be made to grow large population of the Harison Special only to enable the selection of plants carrying higher degree of resistance.

Linseed Breeding.

This is the fourth and final year of breeding work as originally planned and approved by the Trustees of the Sir Sassoon David Trust Fund in 1934. The main objective of selection of higher yielding types having greater percentage of oil combined with superior drying quality was kept in view all along and year by year there has been a drastic reduction in the number of plants retained for further selections. At present there are 18 selections suitable for the Karnatak and Deccan tracts which possess all the three economic characters.

The sub-station at Indi proved a failure for the second time in succession owing to total failure of rains and prevalence of extreme drought conditions. Efforts to keep selections alive by hand watering were of no avail.

Individual selection trial.—Individual selection grown in line cultures showed no variations within themselves indicating that a high degree of purity for yield and morphological characters had been attained by them. The oil percentage is fairly constant but the iodine absorption number indicative of the drying quality of the oil still fluctuates. It is hoped to improve this by hybridization with exotic types.

Varietal trial.—Varietal trials of twenty types belonging to this province (including nine freshly collected) were replicated according to Graeco-Latin Square at Poona. Some of the varieties are found to be superior in point of yield. Varietal trials at Indi as stated elsewhere proved total failure.

Bulk trial.—Bulk sample of the cultures from which the individuals plants were selected when replicated four times, showed no difference

within the types indicating the degree of purity that has been attained by each.

Non-Presidency pure types.—Twenty-two types from other provinces are being maintained pure for utilization of the economic characters possessed by them for hybridization purposes. Twelve new foreign types have been added to the earlier collection bringing the total to twenty-seven in all. Of these the U.S.A. types are characterised by good quality oil. The Argentine types are poor from the point of oil content as well as drying quality of oil. Some of the new introductions have failed to set seed.

Natural Crossing in Linseed.—Three years' observation has indicated that the percentage of natural crossing under Poona conditions is less than 0·5 per cent.

Miscellaneous.—Study of the stages of the development of the seed and its relation to development of the oil and other organic substances is under progress.

A five year scheme for hybridization of the selected material with non-presidency pure types which possess useful economic characters has been submitted to Sir Sassoon David Trust for obtaining the grant. While the selected provincial types have been improved for yield and percentage and quality of oil, they lack in white colour of the seed which could only be introduced by hybridization. This work will be started if the funds requested for are sanctioned.

Breeding Work.

(A) *Selection in Safflower* (*Carthamus tinctorius*).—Safflower is an important edible-oil crop and occupies an area of 436,355 acres in this province. Eighteen samples from representative centres of the province have been collected and were grown during the *rabi* season. The crop grew well and has shown important variations in morphological, floral and seed characters. The types are highly mixed for their characters. Oil percentage of the unselected material varies from 29·5 to 31·90 per cent. About 100 individual plant selections have been made for further studies. Because of the heterogeniety present in these types there appears to be sufficient scope for selection and improvement of the crop.

(B) *Selection in Udid* (*Phaseolus radiatus*).—Among the pulses grown in Bombay province *udid* occupies an important place. It is a crop of high nutritive value and produces rich grain and fodder. Being a leguminous crop it improves the fertility of the soil and it could be used as a useful green-manuring crop. Forty samples have been collected from different centres of the province and will be grown in the *kharif* season for selection. Variations in colour, shape and size of seed have been observed.

(C) *Hybridization in chillies.*—Eight economic types of chillies obtained from the Horticulturist and from outside were grown in order to study

the inheritance of certain characters. F_1 plants of the crosses "Deccan C.G. × Lawangie" and "60-2×Superfine round" were grown and the behaviour of the characters has been recorded. Further studies of the characters will be made in the F_2 generation.

(D) *Inheritance of characters in Castor.*—Four pure annual types of castor differing in character of stem colour, bloom and spines on capsules have been crossed and their F_1, F_2 and F_3 progeny are being studied. The inheritance of stem colour and spine on capsules follows a monomendelian factor ratio while the bloom character appears to be inherited in a complex manner.

(E) *Intergeneric cross between Euchlana and Zea.—Euchlana mexicana* (Teosinte) has been crossed with *Zea mays* (Maize). The progenies have been studied up to F_5 generation for vegetative, floral, cob and seed characters. Some new types combining the characters of the two parents have been selected as useful fodder types.

(F) *Mutation in Groundnut.*—A white-flowered mutant which arose in the local groundnut variety has been grown for three generations and is found to breed true for the white colour of the flower. Crosses between the white and orange-flowered type have been made to find out the origin of this new type.

Miscellaneous Experiments.

African bajri.—In spite of the previous trials it has not been possible to determine the superiority of the African *bajri* over the local type. Previous trials have definitely shown that African *bajri* requires a longer period for its growth and that it lodges badly. In order to determine how early sowing would affect the yield a trial was made and it is found that early sowing is distinctly beneficial and increases the yield of grain and fodder of this variety as compared with the local. A further trial which will include the best spacing and sowing at proper time to suit the African and local *bajri* will be undertaken to decide the merits or otherwise of the former variety.

Vernalization.—Pre-treatment of seed to induce earliness and better yield tried on several crops gave negative results. In the case of wheat one treatment showed that there was some positive effect. This treatment was further continued with the co-operation of the Crop Botanist who grew a duplicate set of the material on the Niphad Farm. Both Poona and Niphad trials have conclusively shown that in all the cases experimented upon, vernalization has not resulted in the production of any effect of economic importance.

Weed-killing.—The utilisation of sodium chlorate for weed-killing was tried on a large scale in a *bajri* plot. Solutions of four different strengths were prepared and applied to the crop. With one per cent. (lowest) strength the percentage of weeds killed was non-grass 84 and grass nil. Applying a two and a half per cent. (highest) solution the percentage of

kill obtained was non-grass 100 and grass 10·4. The weedicide had no bad effect on *bajri* crop.

Classification of tur and groundnut.—The work of compiling the observations made has been taken in hand.

Seed Testing.

102 samples of seeds were tested and reported on.

Longevity test.—A fresh set of eleven grasses is being tested for longevity and germination. The grass seeds have very low percentage of germination. Because of the presence of empty caryopses and the adherence of glumes to the seeds, determination of exact germination percentage in grasses is a matter of difficulty. Different methods are being adopted for getting more accurate results.

Twenty different kinds of indigenous vegetable seeds are under test for longevity since 1935. In many cases there is no appreciable fall in germination percentage so far, showing that they retain the power of viability for some years. The experiment will be continued to a finish.

Miscellaneous Work.

Botanical Court at Karnatak Agricultural Show.—A stall exhibiting models and charts was arranged at the Karnatak Agricultural Show. The exhibits included models showing the advantages of controlled grazing and the injurious effect of indiscriminate grazing. Living hedges of plants useful for fencing were grown *in situ*. Exhibits of medicinal plants, useful grasses and parasitic-flowering plants attacking economic crops were arranged. Demonstration of seed testing was arranged. The stall was visited by a large number of visitors.

Army classes.—This section arranged for a few lectures to be delivered to Indian soldiers belonging to five different units of the army at the Headquarters on "selection and care of seeds". The lectures were given in hindustani by Mr. V. M. Chavan.

Herbarium.—Collection of plants to replace the old stock was undertaken whenever possible. The work of preparing the catalogue is in progress. 178 plant-specimens were identified during the year.

Enquiries.—As in past years a large number of enquiries from the public were attended to promptly. Collection and despatch of seeds and fibres to enquirers from foreign countries and in India was undertaken.

Establishment.

There has been no case of corruption on the part of the subordinates in this section during the year 1937–38.

Publications.

(1) L. S. S. Kumar and W. V. Joshi. — A white flowered type of *Arachis hypogea* L. Current Science, Vol. VI, No. 9, March, 1938.

(2) W. V. Joshi .. (*a*) Xerophytes (Marathi) Shetki and Shetkari, June, 1937.

(*b*) Hydrophytes (Marathi) Shetki and Shetkari, July, 1937.

(*c*) Hygrophytes and Tropophytes (Marathi) Shetki and Shetkari, September, 1937.

AGRICULTURAL COLLEGE,
Poona, 29th July 1938.

L. S. S. KUMAR,
Economic Botanist to Government,
Bombay Province, Poona.

Abstracts of papers published in 1937-38.

1. *A white flowered type of* Arachis hypogea *L.—L. S. S. Kumar and W. V. Joshi, Current Science, Vol. VI, No. 9, March 1938.*—This paper describes the sudden appearance of an extremely pale yellow flower-coloured mutant in the orange flowered local variety. The white type was heterozygous and gave rise to yellow and white flowered progeny which are all breeding true for their respective flower colour in subsequent generations.

2. *Xerophytes, Hydrophytes, Hygrophytes and Tropophytes—W. V. Joshi, Shetki and Shetkari, June, July and September 1937, respectively.*—The articles by Mr. Joshi in Marathi explain in popular language the ecological types of plants which occur under different environmental conditions. The adaptation of the plants to their surroundings is clearly brought out.

Programme of Work under the Economic Botonist to the Government of Bombay, Poona, for the year 1938-39.

(1) *Grass Experiment.*—Rotational grazing experiment at Mangdara Kuran will be continued.

Acclimatised Australian grasses will be grown on large scale and trials on the growth of these grasses will be made in other parts of the province.

(2) *Striga on Jowar.*—Further selection of resistant material will be continued. Field observations on the three species of *Striga* in association with grasses and *jowari* will be made. Cross inoculation experiment on South African Sorghums will be continued.

If the Striga Investigator is appointed during the year the work on technical programme submitted to the Imperial Council of Agricultural Research will be commenced in addition to those stated above.

(3) *Orobanche on tobacco.*—The progeny of resistant plants will be grown on a much larger scale and selection will be restricted to one variety of tobacco, viz. Harison Special.

(4) *Linseed Breeding.*—Hydridization work to introduce white seed colour and boldness of seed, will be undertaken. District trials of selections made will be conducted.

(5) *Seed testing.*—The work on longevity of grass and vegetable seeds will be continued.

(6) *Selection on Udid and Safflower.*—Selection for important economic characters will be done.

(7) *Inheritance studies.*—Studies of inheritance of crosses in chilli, groundnut, castor and Euchlaena X Maize cross will be continued.

L. S. S. KUMAR,
Economic Botanist to Government,
Bombay Province, Poona.

APPENDIX J.

Summary of Work done under the Crop Botanist to Government, Bombay Province, Karjat (Kolaba), for the year 1937–38.

Administration.

During the year under report Mr. B. S. Kadam held charge of the post of the Crop Botanist to Government of Bombay.

Mr. V. K. Patanker, B.Ag., continued as Superintendent of the Rice Breeding Station, Karjat.

One of the Agricultural Sub-overseers, Mr. Y. B. Shitole, was on leave for two months and ten days from 22nd March 1938.

Mr. R. K. Kulkarni was in charge of the Cereal Breeding Station until the evening of 1st of February, 1938, when, after a very brief illness, he expired. Mr. Kulkarni was associated with the Section since the middle of 1933, and had taken keen interest in developing the new station. He was an industrious and an honest worker. His passing away has meant a great loss to the Department.

Mr. S. M. Patel, Bajri breeder, was placed in charge of the Cereal Breeding Station during the rest of the year pending the appointment of Mr. Kulkarni's successor.

There were no cases of corruption in the Section.

Rice Breeding.

Selection Material.

(1) *Selection in Zinya.*—The two improved strains, Z-149 and Z-242, were again compared for the third time with Local Zinya and K-226. The strains were replicated eight times in small plots. The results corroborate last year's findings, that none of the strains shows significant differences. Z-149, however, has given slight increases in yield over the general mean and local Zinya. These strains have been under comparison for the last three seasons and hence the trials will be discontinued from the next year.

From the second lot of Zinya selections, twelve promising selections were compared eight times in row replications. Seven of these appear outstanding over Zinya local. These will be again compared next year.

(2) *Selection in Bhadas.*—The six best selections were compared in nine replications for the third time with B-52 and B-79 as checks. 1-B-12-11 is again not significantly superior to the general mean though

it has yielded best in all the trials for the last three years and therefore it can be released for district trials. Farm trials will be discontinued.

From the second lot, sixteen promising selections were replicated twelve times in rows. All, except one, appear outstanding. These will be again tested next season.

(3) *Selection in Kada.*—The selection 100-4, was compared with Kada local in ten replications by A B B A Method. It is significantly superior to Local Kada. The trial will be continued.

From the second lot nine selections are promising. These will be compared against Local Kada next year.

(4) *Selection in Jirbuti.*—The three promising selections obtained last year were compared with Local Jirbuti in eight replications. Though, there is no significant difference between them, the selection 1-J-61-2 is much superior to Jirbuti Local. These trials will be continued.

From the second lot of Jirbuti selections four appear promising. These will be compared next year.

(5) *Selection in Mahadi.*—The selection M-2-2-35 was compared for the third time with Local Mahadi ten times by A B B A Method. During the year the improved strain was not significantly superior. It is superior to Local in yield by only five per cent. The trial will be repeated on a large scale.

Synthetic material.

(1) *K-42 × Krishnasal.*—The two promising selections mentioned last year and two more from the reserve lot, resembling Krishnasal were compared with Krishnasal and K-540 in eight replications in rows. The cultures Kr-42-482-72-11-28 and Kr-42-482-72-11-29 appear better than the others. These will be compared with Krishnasal and K-540 next season.

(2) *K-42 × K-226; K-42 × B-52; and K-226 × B-52.*—The selections from K-42 × K-226 being inferior to K-42, were discarded. The promising cultures from K-42 × B-52 were compared with B-79. None of them was superior to B-79. This material therefore, will also be rejected. The best cultures from K-226 × B-52, having been found inferior, new selections have been made from the bulk population of the cross. High yielding selections from these will be tried in row replications next year.

(3) (*a*) *K-42 × K-414*, (*b*) *K-226 × K-414.*—From the cross (*a*) two promising cultures were compared with K-42, in row replications. The cultures do not show significant differences. They are, however, equal in yield and their grain is finer. The promising selections will be further compared. Further study in cross (*b*) was discontinued as the line cultures were found poor yielding to the standard strain.

(4) *K-39* × *K-164.*—The strain K-501, which has been purified, was compared with the early strain K-79 along with the mid-late strains K-540 and a new early strain K-540–56–17, in eight replications. The strain K-501 is superior to K-79 in point of yield, though the difference is not significant. K-540 was significantly superior in yield to K-79.

(5) *B-211* × *Sabour 2.*—The three promising selections were compared with B-79 in six replications during the year. None of them is superior to B-79. This cross did not give any desirable combinations, hence it will be rejected.

(6) *P-6* × *K-79.*—The two moth resistant strains are still segregating for moth resistance and susceptibility. The desirable selections will be continued and tested in row replications. The higher yielding strain Patni-515 was compared for the second time with the parents P-6 and K-79 and Kada Local. Significant strain differences in yield were observed, but none of the strains is significantly superior to the general mean as last year. The trial will be continued for one year more.

Yield trials in Districts.

(1) *North Central Division.*—(*a*) The trial of the two Zinya strains Z-149 and Z-242 with Zinya local and K-226 were in the final year at Nondore and Chinchani in the Thana District under sectional supervision. At both the places the strains were replicated eight times in small plots. The results at Nondore show that strain differences were significant in the richer soil. Under poorer conditions at both the places the differences were not significant. It seems that K-226 responds better in richer soil of Thana. Z-149 is fairly good in yield over local Zinya at most of the places. Besides being superior in grain quality, Z-149 is said to have milled better giving higher percentage of whole rice.

(*b*) In order to see how far the new Bhadas selections, namely 1-B-12-7 and 1-B-12-11 behave under cultivators' conditions in Kolaba, trials were taken at three places two at Mahad and one at Umbarda near Pen. The trials at Mahad were a failure. The results at Umbarda show that none of the strains differs significantly from each other. The culture 1-B-12-11, has, however, surpassed the local in yield by 7·5 per cent. The trial will be continued.

Multiplication of seed.

The experimental area of the Rice Breeding Station is only 4 acres. Seed Multiplication is therefore done on a small scale. As 4 to 5 strains have to be multiplied small quantities of each are produced. During the year the various Kolamba strains K-79, K-501, K-540, K-42 and K-226 were multiplied. The seed of K-79, K-184, K-501 and K-540 was supplied to the Deputy Directors, Gujarath, S. C. D. and N. C. D. All the seed of K-42 and part of K-226 was given to the Deputy Director of

Agriculture, North Central Division, Nasik, and some of K-226 to the Deputy Director, Gujarat. Altogether 2,000 lbs. of seed was supplied during the year.

Bajri Breeding.

Having established the facts, (1) that contamination through the muslin bags occurs and (2) that inbreeding results in decreased vigour accompanied with various disabilities, the breeding methods have been revised. In addition to inbreeding, group-breeding and mass-selections are being adopted so as to create higher yielding bulks. The bagging technique has also been modified from this year.

Yield trial of promising bulks.—(*a*) Seven strains in bulk, inbred from 4 to 6 generations, were compared with Local bajri in 6 randomised blocks on ¼th guntha plots. The strain, 187-4 has significantly out-yielded the Niphad Local, giving 565 lbs. per acre as against 460 of the local. Another strain, 28-15, has yielded higher than the local but the difference is not significant. The comparison of promising strains will be continued.

(*b*) In order to locate high yielding material in the early stages of inbreeding, six I_1* Akola bulks were compared with the Niphad Local variety in 4 replications on ¼ guntha plots. The results show that bulks, 297 and 231-8, are promising. These will be retained for purposes of further selection and trial.

Trial of African Bajri.—This is the third year of the trial of African Bajri as a dry crop at Niphad. During the year under report the trial was conducted by ABBA method on half guntha plots using one pound seed rate for the African and four pounds for the Local variety. The yields of grain, fodder and chaff per acre are summarised below :—

Table 1.

Comparison of African and Local bajri during 1937-38.

Produce.	Local bajri at 4 lbs. per acre.	African at 1 lb. per acre.	Difference in favour of local bajri.	Percentage + superiority — or superiority of local over the African.
	Lbs.	Lbs.	Lbs.	
Grain	598	407	191	46·9
Straw	829	1,035	—206	—19·9
Chaff	135	112	23	20·5

*First inbred generation.

It has been consistently observed for the last three years that the African bajri as a dry crop is in no way superior to the local variety. The trial of this variety will therefore be discontinued.

Wheat Breeding.

Synthetic material.

(1) *Natural crosses.*—The strain, B.G. 8-1, isolated from a natural cross of Bansipalli-809 was again compared for the third time with the standard strains Bansi-168 and Bansipalli-808 and the local Bansi, in eight randomized locks on one guntha plots. This year the strains do not show any significant yield differences. There was no incidence of black-stem rust, but due to deficient moisture the growth of crops was very poor. As the strain B.G. 8-1 has not been found to be very consistent in yield behaviour, the trial will be continued.

(2) *Baxi* × *Khapli* 568.—The highest yielding strain, 17-56-63, was compared with pure Baxi-33, by ABBA method in nine replications on 1/11th guntha plots under irrigation. The per acre yields of grain of the two types are 663 lbs. and 683 respectively; the difference in yield among the two strains being insignificant. The strain 17-56-63 has however good lustrous grains compared to Baxi-33 and is slightly earlier in flowering by about a couple of days.

(3) *Baxi* × *Bansippali*-808.—Five families consisting of 8, 5, 8, 6 and 5 cultures were compared on small scale on 1/8th guntha plots with the standard strain 808 under dry condition, and two families consisting of 1 and 6 cultures were compared with the standard irrigated strain Baxi-33 under irrigation. Only one family 31 has given significantly higher yields.

The best material out of the above will be compared again.

(4) *Bansipalli*-809 × *Pusa*-4.—Promising selections with high yield, large grains and non-shedding characters were continued. Of these 12 were compared with Pusa-4 under dry conditions and 4 under irrigated conditions. The material is still segregating for awn length Out of this material *Nos.* 5-1-3-38-5, 5-1-3-50-1 and 5-1-3-52-1 are promising. These families will be further purified and compared.

(5) *Bansipalli*-808 × *Polish.*—The cross was grown in F_2, F_3 and F_4 generations. Promising selections for grain quality and yield will be continued.

(6) *Bansipalli*-808 × *Punjab type I.*—Some promising selections of this cross were grown during this year, but none of them gave any promising material. This cross will therefore be rejected.

(7) *Trial of Pusa*-165.—The strains Pusa-165, Pusa-4 and S.P. 33 were compared with Mondhya wheat in 6 randomized blocks on 74·5 square feet plots, under irrigation. This trial did not show any significant

strain differences. The trial was vitiated due to defective germination. The trial will be continued.

(8) *Sowing date experiment of wheat.*—Bansipalli-808 sown at intervals of one week, i.e., on 15th October 1937, 22nd October 1937, 29th October 1937, 5th November 1937 and 12th November 1937 was replicated 8 times on ¼ guntha plots as in the past two years. This year's results confirm with those of past two years. It is found that there is no significant difference in yield of either grain or straw between different sowing under dibbled conditions. The trials will be continued under drilled condition.

Black stem rust of wheat.

(1) *Differential hosts.*—Various differential hosts were maintained. Out of the several crosses made for obtaining resistance, only Varnal × Khapli-76, cross was successful, and a large number of seeds of F_1 are available.

(2) *Selections in Khapli wheat.*—Out of 97 selections of last year, 12 were continued and 69 fresh selections from Khapli bulk samples of districts were grown. These will be continued.

(3) *Hybridization.*—The F_1 plants from the crosses of immune Russian wheat and improved wheats turned out to be completely sterile last year. From out-crosses and bulk-crosses made, only 3 crosses and one selfed seed were obtained. All the four seeds germinated but the plants turned out again completely sterile, yielding only 2 shrivelled seed of (F_1 808 × Typicum) × 808. Further back crossing was attempted between F_1 (808 × viticulosum) × 17-56-63 and B.G. 8-1, 5-1-3-52 (a derivative from 809 × Pusa-4) and F_1 (Varnal × Khapli) with the results that 1, 1 and 4 seeds respectively were obtained. These will be grown next year.

Multiplication of seed.

The standard strains Bansipalli-808 and Bansi-168 and 224 were multiplied each on half an acre for maintaining the chain of pure seed supply. Bansipalli-808 was also multiplied on about 4 acres of the leased-out land and 1089 lbs. of pure seed was collected from the area. The produce from the leased area however had had to be sold to the public as the Deputy Director, North Central Division, Nasik, did not purchase it, although the seed was good. Altogether 1,140 lbs. of seed of various strains was distributed.

GRAM BREEDING.

Selections.

(1) *Yield trial.*—Seven early strains were compared with local gram on 1/8th guntha plots in 6 replications. Strains G-693 and G-816 gave 6 and 3 per cent. increases over local but the differences are not significant.

The strain G-693 is, however, significantly superior over the general mean. In another small scale test of G-816 with other six new selections and the local, G-816 has given significantly higher yield over the local. The grain of this strain is bigger and has attractive yellow colour. Both the strains are now ready for village trials.

(2) *Nipping of gram.*—Last year's results showed that nipping resulted in much lower yields than the non-nipped crop. This year the experiment was modified. Nipping was done at 3 different periods, viz., (1) before flowering (31 days after sowing), (2) at flowering (after 38 days), (3) after flowering like the local practice (after 47 days). The variety used was G-693 and the treatments were replicated 12 times on 1/8th guntha plots. The experiment showed significant differences, the un-nipped crop exceeding in yield all nipped treatments. The yield progressively decreased with later nippings, the local practice being significantly lower in yield to the untreated crop. The experiment will be continued.

Breeding of minor Crops.

(1) *Val*—(*a*) *Selections.*—Six old selections together with three new ones were compared with local Val of Karjat in a Latin Square. The Virus disease of yellowing of the plants was severe during this year. The replications only, escaped from the attack. From their results, it is observed that the old selection Y-14 and the new 2K-2 are superior in yield to the rest. It appears that the selections from each group change their yielding capacity according to season. Next year the three groups, namely (1) Y group (2) K.R. group and (3) 2K group will be compared with Karjat Local in a Latin Square trial.

(*b*) *Hybridization.*—The crosses of the Madras types with local strains grown as bulks failed as they do not thrive well. The work will be discontinued.

(2) *Rala—Setaria Italica.*—Two new selections of Rala Nos. 4 and 11 were compared with local rala in 5 randomized blocks of 1/16th guntha plots. The experiment did not show any significant strain differences. The trial will be continued.

(3) *Tur—Cajanus indicus.*—(*a*) T-24 was tried against the local variety by the ABBA method on row scale sown according to local system of sowing the pulse at intervals of every 8th row in a field of Bajri. There were 8 replications. The results show that T-24 has given significantly higher yield over the local; the per acre yield, with bajri as the main crop, being 125 and 107 lbs. respectively.

Four promising selections from the reserve material of last year were compared with T-24 and local 6 randomized replications on rod row scale. This experiment did not show any significant strain differences.

(4) *Linseed.*—Three promising strains of linseed from the last year's trial with an addition of 5 fresh strains from the reserve

material were compared with the local linseed of Kundewadi in 7 randomized blocks on 1/8th guntha plots under drilled condition. The experiment did not show any significant strain differences. The selection Kundewadi-3 which gave 13 per cent. higher yield over the local last year has given only 5 per cent. more yield over local this year. The trials will be continued.

(5) *Flowering in linseed.*—Under Niphad conditions linseed flowers commence to open at 7 a.m., and completely open out up to 10–30 a.m. Colder days delay anthesis which may go on as late as mid-afternoon. Linseed flowers reopen again next morning. The second opening is invariably earlier than the first. Anthers dehisce before the flowers open fully. Apart from the influences of temperature and humidity strain differences also to some extent influence the march of anthesis in linseed.

Co-operative Studies.

(1) *Agricultural Meteorological observation.*—Precision experiments in rice were conducted during the year under report. The data collected was supplied to the Agricultural Meteorologist, Poona.

(2) *Wheat rust.*—Stationary slide exposures were made throughout the season. The exposed slides were sent to Dr. K. C. Mehta of Agra College, Agra.

(3) *Vernalization.*—Seed of Bansi 103 supplied by this station was vernalized by the Economic Botanist, Poona, and it was grown for him. There is no difference in flowering between the vernalized and the central seeds.

PUBLICATIONS.

(1) Anonymous (1937).. Improved Rice strains in the Bombay Presidency, Leaflet No. 1 of 1937, *Bombay Dept. Agri.*

(2) Anonymous (1937).. Improved strains of wheat in the Bombay Presidency, Leaflet No. 2 of 1937, *Bombay Dept. Agri.*

(3) मुंबई इलाख्यांतील गव्हाच्या सुधारलेल्या जाती, हस्तपत्रक नं. २, १९३७, मुंबई इलाखा शेतकी खातें.

(4) Kadam, B. S. (1937).. Millets, *Agriculture and Animal Husbandry in India.* Imp. Coun. Agri. Res., pp. 136-144.

(5) Kadam, B. S. and S. M. Patel (1937). Studies in field-plot technique with *P. Typhoideum, Rich Empire Jour. Expt. Agri., Vol. V., No.* 9, pp. 219–230.

(6) Kadam, B. S., Kulkarni, R. K. and S. M. Patel (1938). Natural cross-pollination in linseed. *Madras Agri. Jour.*, Vol. XXVI, No. 1, pp. 3–9.

(7) Patel, S. M. (1938) .. A modified method of bagging plants. *Current Science,* Vol. VI, No. 9, pp. 487.

B. S. KADAM,
Crop Botanist to the Government
of Bombay, Karjat (Kolaba).

Abstract of publications contributed by the section of the Crop Botanist to Government of Bombay, Karjat, during the year 1937-38.

(1) Anonymous (1937).. Improved Rice strains in the Bombay Prsidency, Leaflet No. 1 of 1937, *Bombay Dept. Agri.*

The improved strains of rice evolved by the various Rice Breeding stations of the province are described. The work in progress at the various rice stations is briefly stated and suggestions as to how to keep seed of improved strains pure and where to obtain it are given.

(2) Anonymous (1937).. Improved strains of wheat in the Bombay Presidency, Leaflet No. 2 of 1937, *Bombay Dept. Agri.*

Improved strains of both irrigated and dry wheats are described. Hints to maintain the purity of improved varieties are given.

(3)

A free translation of leaflet No. 2 in Marathi.

(4) Kadam, B. S. (1937).. Millets, *Agriculture and Animal Husbandry in India.* Imp. Coun. Agri. Res., pp. 136-144.

The chapter summarizes the work done in various provinces during 1935-36 on various aspects of breeding, manuring and agronomy of jowar, bajri, ragi and other lesser millets.

(5) Kadam, B. S. and S. M. Patel (1938). Studies in field-plot technique with *P. Typhoideum*, *Rich Empire Jour. Expt. Agri.*, Vol. V, No. 9, pp. 219-230.

During the season of 1933 and 1934 an acre of bajri crop was harvested in unit plots of $\frac{1}{2}$ and $\frac{1}{4}$ guntha respectively. The plots had dimensions of $16\frac{1}{2} \times 33$ feet and $16\frac{1}{2} \times 16\frac{1}{2}$ feet. The unit plots were combined in various ways to form plots of different shapes and sizes in well, poorly and badly arranged blocks. After eliminating the soil variance it was found that standard errors diminished with the increase, in size of plots in well arranged blocks but in the poorly and badly arranged blocks the reverse was the trend. Smaller plots gave more information per unit area than larger plots. Plots in well arranged blocks were more efficient than the corresponding plots in poorly and badly constructed blocks. For field trials $\frac{1}{2}$ guntha plots are, however, more practicable than $\frac{1}{4}$th guntha plots.

(6) Kadam, B. S., Kulkarni, R. K. and S. M. Patel (1938). Natural cross-pollination in linseed. *Madras Agri. Jour.*, Vol. XXVI, No. 1, pp. 3-9.

Under Niphad conditions amount of natural crossing varies from 0 to 6·75 per cent., the average being slightly over 3 per cent. It appears that in Peninsular India vicinism in this crop plant is higher than in the Gangetic alluvial area. For the protection of plants muslin bags have been found better than butter-paper bags.

(7) Patel, S. M. (1938).. A modified method of bagging plants. *Current Science*, Vol. VI, No. 9, pp. 487.

A new method of tying pollination bags to an iron post is described. The iron stake is driven deep in the soil near the stem of the plant and the bag slipped over both the plant and the stake. This gives rigidity to the bag preventing it from blowing off during heavy winds.

B. S. KADAM,
Crop Botanist to Government of Bombay.

Programme of work under the Crop Botanist to Government of Bombay, Karjat, for the year 1938-39.

Rice Breeding.

1. Selection from Zinya, Bhadas, Kada, Jirbuti and Mahadi varieties will be further tested.

2. Synthetic material from the various crosses will be continued further for purification and comparison.

3. Yield trials of improved strains will be continued in North Central Division.

Bajri Breeding.

1. New method of bagging and group breeding etc., will be continued.

2. Comparison of promising inbred lines will be continued along with their open pollinated bulk seeds.

Wheat Breeding.

1. Trial of new improved strains with others will be continued.

2. Comparison of Baxipalli 17-56-63 strain with Baxi-33 will be continued.

3. Derivatives from various crosses will be further purified and tested.

4. Material for black stem rust resistant wheats will be maintained and increased.

5. The trial of Pusa 165 will be repeated.

Gram Breeding.

1. Yield trials of old and new selections will be continued.

2. Pruning experiment in gram will be repeated.

Breeding of Minor crops.

1. Selections in Val will be continued and compared with local.

2. Selections in Rala will be compared with local.

3. Trials of improved strains of Tur will be continued.

4. Improved types of Linseed will be further compared.

B. S. KADAM,
Crop Botanist to Government
of Bombay, Karjat.

APPENDIX K.

SUMMARY OF THE WORK DONE UNDER THE PLANT PATHOLOGIST TO GOVERNMENT, BOMBAY PROVINCE, POONA, FOR THE YEAR 1937-38.

Dr. B. N. Uppal held charge of the section throughout the year except for the period of his leave from the 1st May to 19th May 1937, inclusive, when Dr. M. K. Patel acted for him. Dr. M. K. Patel was also on leave from the 30th March to 30th April 1937. Mr. M. N. Kamat acted as Assistant Professor of Mycology from the 3rd April to 19th May 1937, *vice* Dr. M. K. Patel. Mr. S. P. Dhamale acted as Assistant Mycologist *vice* Mr. M. N. Kamat.

Mr. K. F. Kheshwalla, Assistant Plant Pathologist, Koleroga Investigation, Sirsi, was on leave on medical certificate from the 6th April to 7th August 1937, and reverted to his substantive post under the Government of India with effect from the latter date. Mr. M. K. Desai, Agricultural Overseer under the Deputy Director of Agriculture, Southern Division, Dharwar, was appointed Assistant Plant Pathologist and took over charge of his duties on the 1st December 1937.

Mr. S. P. Shah, Sann Investigator, was transferred to the scheme for the breeding of wilt-resistant types of cotton for the Surat area, and joined his duties at Shera on the 1st April 1937. Mr. V. P. Bhide was appointed Sann Investigator with effect from the 4th May 1937.

The gazetted staff on the Bombay Virus Scheme has not yet been appointed.

Messrs. Y. S. Kulkarni and J. D. Ranadive continued to work as Pathological Assistants on the Cotton Wilt Breeding Scheme, Poona.

Mr. B. S. Varada Rajan continued to work as Research Assistant for survey in connexion with oversummering of cereal rusts in Bombay.

I have also to note that no case of corruption on the part of Government servants under my control came to my notice during the year.

Education.

The Plant Pathologist to the Government of Bombay was assisted by the Assistant Professor of Mycology in the teaching of plant pathology and agricultural bacteriology at the College of Agriculture, Poona. During the year there was one special student engaged in research in plant pathology.

Research.

1. *Fusarium wilt in sann hemp.*—The work on the relative pollinating efficiency of *Apis* and *Megachile* bees was continued during the year. The results were similar to those of last year. There was, however, no

marked difference in the seeds in Megachile-and Apis-stimulated pods. The Apis bees vary much in size and whenever a bee with a longer abdomen than the normal visits a flower, cross fertilisation is usually effected; otherwise stimulation by Apis bees usually results in self-fertilisation. Megachile bees are very effective in cross fertilisation of sann hemp flowers.

The seed of D-IX, the wilt-immune strain, was multiplied in a large muslin cage on the College Farm; Megachile bees were used for pollination. Heavy rains in September affected flowering and there was also severe attack of anthracnose caused by *colletorichum curvatum* Briant and Martyn. Both these factors adversely affected the yield.

In order to maintain purity of the seed, a few plants of D-IX were grown in large galvanised iron containers and covered by muslin cages. These plants were sib-crossed by hand to produce seed.

Three pounds of D-IX seed was sent to Dharwar for multiplication in the open. The plants suffered from lack of moisture, and only 19 pounds of seed was produced.

The F_1 progeny of the cross between the immune and susceptible individuals of sann hemp was tested in pots of heavily infected soil in soil temperature tanks of Wisconsin type held at about 26°C. All F_1 plants showed wilt symptoms, thus indicating that susceptibility to wilt is a dominant character. Fourteen of the F_1 plants showing wilt symptoms were transferred to sterilised soil but only six plants survived. These plants were grown under cages and cross pollinated by hand. The F^2 progeny will be tested during the next season.

Some of the F_1 plants have also been back crossed with resistant and susceptible parents.

2. *Wilt in Lathyrus sativus.*—The fungus isolated from wilted *lang* plants was multiplied on the lang-meal medium and mixed with sterilised soil in earthen pots. The seed was sown in the infected soil; the wilt symptoms appeared a fortnight after the emergence of seedlings and within one month all plants were dead. *Fusarium* was isolated from wilted plants, which proved pathogenic on reinoculation.

Rhizoctonia was also isolated from wilted plants in the field. The fungus was multiplied on Richards's medium and incorporated in sterilised soil. Disease symptoms were noticed in seedlings 20 days after emergence from the soil, and within 40 days all plants had wilted. *Rhizoctonia* was reisolated from dead plants.

The physiology of the wilt organism is being studied.

For the isolation of wilt-resistant types of *Lathyrus sativus*, wilt compost has been prepared for the gross inoculation of a plot on Broach Farm and another on the College Farm, Poona. From next year it is proposed to test the wilt resistance of *lang* in these plots.

The pollination in *lang* flowers is also being studied.

3. *Powdery mildew of betel vine.*—Experiments on the control of betelvine powdery mildew were continued during the year. The results are in agreement with those obtained in the past two years and show that mildew can be effectively controlled by one application of sulphur in the case of newly-planted gardens, whilst two applications of sulphur are necessary in old plantations.

The causative fungus of powdery mildew is an ectophyte, which feeds by sending globular haustoria into the epidermal cells of the leaf. The fungus is new to science, and the name proposed for it is *Oidium piperis* spec. nov.

4. *Fig rust.*—It was stated in the last report that, although Bordeaux mixture is very effective in controlling fig rust, it is not liked by growers since the fungicide leaves a spray residue on the fruit, which reduces the market value of the latter. Sulsol is more satisfactory as it does not stain the fruit. Two strengths of Sulsol, 2 in 100 and 2½ in 100, were tested during the season. Sulsol was quite effective in controlling rust infection, but the attack of rust was very mild during the year. The experiment will therefore be repeated.

5. *Ripe rot and twig blight of mango.*—Young seedlings of *Alphonso* and *Piari* varieties of mango in pots were artificially inoculated with a fresh culture of *Phoma* sp. A small bit of the fungus growth was inserted into a longitudinal slit on the twig, and the wound was wrapped up with wet cotton wool. The inoculated plants were covered with bell-jars. In all cases plants were successfully infected.

The causative fungus has also been further studied in culture.

6. *Black rot of custard apple.*—The fungus, *Diplodia* sp., has been studied in culture. The temperature relation of the disease shows a close parallelism with that of the parasite. The fungus also produced fruit rot in apple, peas, pomegranate, mango, mosambi and grape fruit.

7. *Bacterial leaf-spot of soya bean.*—The morphology and biochemical properties and cultural characters of the organism causing leaf-spot of soya bean have been studied in detail. These features resemble those of *Phytomonas phaseoli* var. *sojense* Hedges.

A detailed report of this work has been submitted for publication.

8. *N-fixation in rice fields.*—It was stated in the last report that cultures of *Azotobacter* when inoculated into Ashby's solution in which roots of rice seedlings had previously been dipped for varying lengths of time ranging from 10 minutes to 10 days fixed progressively less amounts of nitrogen. It has been found that pH value of Ashby's solution increases in direct proportion to the length of time for which rice roots are immersed in the solution. This change in the pH value of the solution adversely affects the activity of *Azotobacter* with the results that smaller amounts of nitrogen are fixed.

These results are being written up for publication.

9. *Koleroga of betel nut.*—It is generally agreed that *Phytophthora arecæ* does not normally produce oospores in nature. There are also many localities where the alternate hosts of the fungus do not exist. It has therefore been a moot point as to how primary infection is initiated in such areas. A few years ago a suggestion was made by us that the fungus perennates as dormant mycelium in the crown of areca-nut trees which have been dead as a result of infection. This possibility was tested during the current year, and isolations were made from the dead tops of betelnut trees during the hot season from February to May. These results indicate that the fungus hibernates as mycelium in the dead portion of the crown but becomes scarce as the hot weather approaches. Oospores were never found in the dead portions of the crown. On May 23, a dead crown of a tree was split open and the fungus was profusely growing inside the tissue; the pathogenicity of the fungus was tested on young betel nuts.

10. *Betelvine anthracnose.*—The plants affected by anthracnose have invariably been found to have their roots infested with nematodes. It is therefore not clear at present whether *Gloeosporium* is an active parasite or follows in the wake of invasion of the roots by nematodes.

11. *Panama disease of bananas.*—Trials at Ale to test the resistance of different varieties of bananas to Panama disease have proved inconclusive. Another infected plot has been selected at Rajuri near Ale for the purpose of conducting these trials.

12. *Mottle-leaf of mosambi.*—Mottle-leaf has become a serious disease in citrus gardens in the Ahmednagar and Kaira Districts. The disease is caused by a deficiency of zinc in the soil. A badly diseased garden near Belapur was sprayed with zinc sulphate-lime mixture 5-2½-50 to which either one pound of casein or two ounces of agral was added as a spreader. Two applications were made at an interval of about one month. The plants affected with mottle-leaf responded to the treatment and recovered from the disease. It is proposed to conduct spraying trials on a large scale.

13. *Tobacco seed-bed diseases.*—Isolations from dead seedlings in tobacco seed-beds at Nadiad gave *Pythium* in culture. The treatments tested during the year gave inconclusive results since the attack of "damping-off" was very slight.

It is proposed to test the value of Cheshunt compound, Bordeaux mixture and formaldehyde in the treatment of damping-off.

14. *Cotton Wilt Breeding Scheme.*—The following is a brief summary of the report of the work done during the year:—

(I) *Broach section—(a) B.D. 8.*—In 1936-37 seventeen plants of *B.D. 8* free from leaf mottling symptom were selected from a large number of plants tested under conditions of optimum infection. These plants were transplanted in an infected field, and seed from nine plants was tested in the season; the other eight plants were rejected as they showed slight root-discoloration indicating that they were infected.

All the nine cultures tested during the year suffered mortality from wilt in varying degrees, although some of the cultures such as B.D. 8-6-35-9-28, B.D. 8-6-35-9-35 and B.D. 8-6-35-9-16 showed a high degree of resistance. Further tests will be continued.

(*b*) *N.S.* 12.—In 1936-37 twenty-seven plants free from leaf mottling symptom were selected and transplanted in an infected field. The seed of 19 plants was tested in pot culture during the season; the other plants were rejected as they showed root discoloration.

None of the 19 cultures tested was free from death, although there were a number of cultures showing a very high degree of resistance. Further tests will be continued.

(*c*) *Crosses.*—Crosses of B.D. 8 with Goghari and N.S. 12 showed high infection; but the progeny will be further tested.

(*d*) *Russian Herbaceum cotton.*—Fourteen cultures were supplied by the Cotton Breeder, Broach, for determining their wilt reaction under conditions of optimum infection. Only two cultures are promising.

(*e*) *Studies in the relation of soil moisture to Wilt infection.*—Soil moistures ranging from 30 to 70 per cent. on the basis of the water-holding capacity of the soil were tested. Wilt infection was at its optimum in a soil moisture range of 40 to 60 per cent.

(II) *Jalgaon section*—(*a*) *Million Dollar.*—In 1936-37, 131 plants of Million Dollar free from "mosaic" symptoms were transplanted in an infected field. The seed of 103 plants was tested during the season; the other plants were rejected as they showed root discoloration.

Of 103 cultures tested in pot culture during the last season, 76 gave no mortality. These cultures will be tested further.

(*b*) *Chinese* R_1 *Spotless.*—This is another promising cotton from the point of wilt resistance. Ten cultures were tested for wilt resistance in pot culture; nine cultures were entirely free from death symptoms, and one of the cultures gave a slight mortality of 1·6 per cent. Further testing will be continued.

(*c*) *New Million Dollar.*—A small quantity of selfed seed of this cotton was obtained from the Nanking University, China. The seed was tested in pot culture under conditions of optimum infection. All the seedlings remained healthy at the conclusion of the test, although a few plants showed "mosaic" symptom. Thirty-seven plants were transplanted in an infected bed. Further testing will be continued.

(*d*) *Wilt Survey.*—At the request of the Cotton Breeder, Jalgaon, a wilt survey was made in West Khandesh, which is reported to be free from wilt. Wilt was common in Sakri Taluka of West Khandesh.

(III) *Surat section.*—The object of the scheme is to obtain a strain of cotton which is suited to the natural conditions obtaining in the Surat tract and at the same time is completely resistant to wilt. This will be done either by selection in 1027 A.L.F. or by crossing a suitable similar cotton with B.D. 8 or other wilt-resistant strains.

The scheme is in its first stage of field selection. A plot of land at Shera near Ankleshwar has been artificially infected, and in the course of a year or two it will be ready for the testing of cotton strains for wilt resistance.

The testing work is at present confined to the Broach Farm and the Surat Farm. Several selections have been made, but the work is yet in its early stage.

15. *Wheat Rust Scheme.*—The Imperial Council of Agricultural Research have sanctioned a scheme for testing rust reaction of *Durum* wheats in connexion with the breeding of rust resistant types. The scheme is for five years and will cost Rs. 51,280. The work will be done at Mahableshwar and during the monsoon at Poona. The present scheme is for Bombay and the Central Provinces but, as the need arises, it will be extended to the whole of peninsular India.

16. *Bombay Virus Scheme.*—The construction of glasshouses and an insectary has been started, and it is hoped that these houses will be completed in time to launch the scheme in 1939.

17. *Black spot of mango.*—The specimens of this disease were first collected by Mr. W. J. Jenkins, Director of Agriculture, Bombay, at Vengurla in 1937. The disease is characterised by black specks on ripe *Alphonso* fruits, but these specks do not generally enlarge in extent and run into each other to produce larger spots. The disease has not so far been reported from other parts of the Ratnagiri District. The fruit disfigured by the disease are hardly 0·25 per cent. of the total fruit of the district.

Mr. E. W. Mason and Dr. G. R. Bisby, to whom the fungus was sent for opinion, consider that it is a new species of the monotypic genus *Actinodochium* Syd. The pathogenicity of the fungus has not yet been established.

Advisory Work.

A large number of enquiries on plant diseases were dealt with during the year, and advice was given promptly whenever required. These enquiries have been steadily increasing during the past few years.

The Karnatak Agricultural Show was held during the year, and at this show a section on plant diseases was organised. Similarly, exhibits of plant diseases and of appliances for control of these diseases were displayed at many district and taluka shows and notably in the Indian Industries Fair in Bombay.

The work on the disease survey of the Province was continued during the year.

Miscellany.

Necessary facilities were provided to Dr. K. C. Mehta for making stationary slide exposures at different stations in the Province of Bombay in connexion with his studies on the dissemination of wheat rusts in India.

Mr. B. S. Varada Rajan, who was appointed by the Imperial Council of Agricultural Research for the survey of places of oversummering of black rust of wheat in this Province, completed his work during the year.

Another consignment of Peerless Dust Guns was imported from America with the help of an advance from the Personal Ledger Account of the Director of Agriculture, Bombay. These machines were sold to *bona fide* growers in this Province at cost price of Rs. 38 each.

Dr. B. N. Uppal continued to work as Secretary-treasurer of the Agricultural Graduates' Employment Board.

For the co-ordination of the research and propaganda work on Insect Pests and plant diseases, the Government of Bombay have appointed a committee called Insect Pest and Plant Disease Committee, of which Dr. B. N. Uppal has been appointed the Secretary.

PUBLICATIONS.

(1) UPPAL, B. N., PATEL, M. K. and KAMAT, M. N. Alternaria blight of cumin. *Ind. Jour. Agric. Sci.* 8,49-62. 1938.

(2) UPPAL, B. N., PATEL, M. K. and KAMAT, M. N. Bacterial leaf-spot of soya bean in Bombay. *Jour. Uni. Bombay* 6, part V. 1938.

(3) UPPAL, B. N. and KAMAT, M. N. Powdery mildew of betel-vine. *Current Sci.* 6, 611. 1938.

(4) UPPAL, B. N. Breeding for wilt resistance in cotton. *Conf. of Sci. Workers on Cotton in India I.C.C. Bombay Cotton Myc. Paper No.* 1.

(5) KAMAT, M. N. Jasmine rust and its control. *The Gardner* (Poona), Vol. 2., 114. 1938.

(6) Control of the grain smut in jowar. *Bombay Dept. Agric. Leaflet No.* 7 *of* 1937.

B. N. UPPAL,
Plant Pathologist to Government.

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Programme of Work under the Plant Pathologist to Government for the year 1938-39.

(1) *Fusarium wilt in sann hemp.*—The seed of the wilt-resistant strain will be further multiplied. The study in the mode of inheritance of resistance to sann hemp wilt will be continued.

(2) *Wilt in Lathyrus Sativus.*—The study of casual organisms will be continued. The work on the isolation of wilt-resistant types will be undertaken.

(3) *Powdery mildew of betel vines.*—It is proposed to conduct large-scale trials on the control of powdery mildew by sulphur dusting. The work on the casual agent will be completed.

(4) *Fig Rust.*—The value of Sulsol in control of fig rust will be further tested.

(5) *Ripe rot and twig blight of mango.*—The work on the casual agent will be continued.

(6) *N-fixation in rice fields.*—Laboratory work on *Azotobacter* will be continued for another year.

(7) *Koleroga of betel nuts.*—The life-history of the agent of " Koleroga " of betel nut will be further studied. Tests on adhesives will be continued. Some mycological work on *Phytophthora arecæ* and related *Phytophthoras* will be undertaken.

(8) *Panama disease of banana.*—Tests on the varietal resistance of bananas will be continued at Rajuri near Ale.

(9) *Mottle-leaf of mosambi.*—It is proposed to conduct large-scale trials on the control of mottle-leaf with zinc sulphate-lime mixture.

(10) *Tobacco seed-bed diseases.*—Further work on the control of these diseases will be continued.

(11) *Cotton Wilt Breeding Schemes.*—This work will be continued.

(12) *Wheat Rust Scheme.*—It is proposed to build glasshouses at Poona and Mahableshwar before starting the work.

(13) *Bombay Virus Scheme.*—It is anticipated that the scheme will be launched during the year, and it is proposed to undertake the investigation of the virus diseases of cardamom and *bhendi.*

(14) *Black spot of mango.*—The pathogenicity of the organism will be tested and the organism will be studied in culture.

(15) *Disease Survey.*—This work will be continued.

B. N. UPPAL,
Plant Pathologist to Government.

Abstracts of papers published during 1937–38.

(1) UPPAL, B. N., PATEL, M. K. and KAMAT, M. N. Alternaria blight of cumin. *Ind. Jour. Agric. Sci.* 8, 49–62. 1938.

Alternaria blight of cumin occurs sporadically in the Kaira District in Gujarat. The disease attacks the aerial parts of the plant. In the early stages of attack the affected plants show minute, whitish necrotic areas which turn purple with age and later become brown and finally black. These areas are first exceedingly small in extent but, as they enlarge, become obliterated in the general invasion. The disease ultimately kills the affected parts, particularly the succulent leaves and blossoms. The attacked plants bear no seed, but, if some seed is produced, it is usually shrivelled, dark coloured and of poor germinability.

The fungus is extremely pathogenic on cumin, but failed to pass to other plants in cross-inoculation tests. The fungus is able to over-summer in plant residues in the field. It is probable that infected seed also plays an important part in the perennation of the fungus and in initiating primary infection.

The mycelium of the fungus produces the enzymes emulsin, trypsin, erepsin, amylase, lipase and inulase. The morphology and cultural characters of the fungus are described. The fungus is considered to be a new species of *Alternaria* and is named *Alternaria burnsii*, with English and Latin descriptions.

(2) UPPAL, B. N., PATEL, M. K. and KAMAT, M. N. Bacterial leaf-spot of soya bean in Bombay. *Jour. Uni. Bombay* 6, part V. 1938.

The disease is a recent introduction into this country and was first reported in 1934 from the Jalgaon Farm.

The lesions on leaves, on first appearance, are minute, chlorotic areas, which slowly turn sanford brown and are slightly raised in the centre. In young spots the raised centres may be seen on both sides of the leaves. These intumescences rupture the epidermis and finally shrivel and slough off. The mature lesions or spots vary in size from minute specks to large brown areas, which latter measure about 2 mm. and are caused by the fusion of smaller lesions. These spots are usually surrounded by yellow borders. Heavily infected leaves prematurely turn yellow and drop off.

The disease is also noticed on petioles and stem where it usually takes the form of long, narrow streaks. Infection of leaf-veins sometimes takes place. Pods have never been found to be infected under natural conditions.

The pathogenicity of the bacterium was tested on a number of varieties of soya bean. No other leguminous plant was infected in cross inoculations tests.

The morphology and biochemical properties and cultural features of the organism show that it resembles *Phytomonas phaseoli* var. *Sojense* Hedges.

(3) UPPAL, B. N., and KAMAT, M. N. Powdery mildew of betel vine. *Current Sci.* 6, 611. 1938.

The mildew is prevalent in Bassein and makes its appearance during the cold months and practically disappears as the hot weather approaches. Older plantations are more liable to attack than newly planted vines.

The disease is recognised by the appearance of yellow spots, which are slightly raised and irregular in outline, and correspond in extent to white powdery patches of mildew on the under surface of the leaves. The patches of mildew are also sometimes found on the upper surface of the leaves.

Usually one application of 200-mesh fine sulphur is sufficient for effective control of mildew, but in older gardens two dustings are generally required. In the absence of the treatment the leaves have to be plucked as soon as they are ready for harvest; otherwise they are disfigured by spots and drop down if infection is severe. Apart from checking mildew, sulphur dusting has therefore the effect of prolonging the life of the leaves which can be harvested to suit the market conditions.

The fungus is an ectophyte and feeds by sending globular haustoria into the epidermal cells on the leaf. The name proposed for it is *Oidium piperis* spec. nov.

(4) UPPAL, B. N. Breeding for wilt resistance in cotton. *Conf. of Sci. Workers on Cotton in India, I.C.C. Bombay Cotton Myc. Paper No. 1.*

The author discusses the value of testing the resistance of cotton varieties to wilt under conditions of optimum infection such as soil temperature of about 26° C. The pot culture method of testing is superior to field testing as a means of determining the wilt resistance of varieties of cotton since in pot culture it is possible to obtain uniform conditions both in respect to inoculum and soil temperature.

The details are given of pot culture tests in respect of wilt resistance of a number of cottons. By this method it is found possible to isolate very highly resistant or 100 per cent. resistant types of cotton (which suffer no mortality from wilt but show leaf mottling symptom) in the course of three or four years. The mode of inheritance of resistance to Fusarium wilt diseases, is also discussed.

(5) KAMAT, M. N. Jasmine rust and its control. *The Gardener* (Poona), vol. 2, 114. 1938.

In a popular note on Jasmine rust the author describes the symptoms of the disease and the damage caused by it. Spraying young shoots with Bordeaux mixture 3-3-50, preceded by a thorough but judicious prunning in the beginning of the monsoon, has given good control of jasmine rust. The first spraying should be given when the new shoots are 1 to 1½ feet long followed by another spraying at the beginning of the cold season.

B. N. UPPAL,
Plant Pathologist to Government.

APPENDIX L.

Summary of Work done under the Livestock Expert to Government, Bombay Province, Poona, for the year 1937-38.

Personnel.—Mr. Edw. J. Bruen held charge of the Livestock Section from 4th December 1937 after his return from leave, relieving Mr. B. S. Patel who worked as Livestock Expert during Mr. Bruen's absence.

The work done by the Livestock Expert to Government can be classified under the following headings :—

1. *Livestock Improvement.*—Pedigreed livestock breeding on the Government Farms and extension of purebred stock in villages.

2. Rural Uplift Work as far as Livestock Improvement is concerned.

3. Palghar Dairy District Scheme.

4. Work on Livestock research financed by the Imperial Council of Agricultural Research.

The progress made during the year under each of the headings is embodied in the following report. The activities of this Section mainly are :—

(*i*) The Advisory Work.

(*ii*) Propaganda and teaching in the villages.

(*iii*) The breeding of purebred stock and their improvement on Government subsidized and private cattle breeding farms.

(*iv*) The breeding and research in poultry at the Government Central Poultry Farm, Kirkee, and other private and Government aided farms.

(*v*) The improvement of cattle in villages by placing out purebred premium bulls.

(*vi*) The improvement of village poultry by introduction of purebred fowls.

(*vii*) The encouragement of keeping better cattle by holding cattle shows, rallies and demonstrations.

(*viii*) The improvement of the milch buffalo.

(*ix*) The registration of purebred stock of the various breeds in Breed Herd Registers.

(*x*) Propaganda in storage and utilisation of fodder in the form of hay and silage.

(*xi*) The working of His Excellency the Viceroy's Gift Bull Scheme.

(*xii*) The working of the Livestock Improvement Act.

Advisory Work.—Due to the impetus given by the Rural Uplift Work and His Excellency the Viceroy's Gift Bull Scheme, we have been able to extensively distribute purebred stock produced on our Farms and in our intensive cattle breeding villages. As a result of this, inquiries regarding cattle, dairying and poultry are daily on an increase.

Propaganda.—The demand for better cattle, sheep and poultry far exceeds our resources to supply the same. The word propaganda is generally taken to mean, the advancement of a cause through lectures, leaflets, advertisements, etc. But in livestock improvement, example has to come first and precept afterwards. The pedigreed stock put out in villages has to be practically useful before the talk can be of any avail and particularly because it takes some years before the usefulness of these animals can be apparent. The persons looking after this work have to be very careful in selection of individuals to whom the stock is given and also in selection of animals, generation after generation. For this reason the propaganda in a village selected for this purpose has to be continuous and has to be worked by men whose tenure at these posts is not shifted quickly. These are the main principles on which the Livestock propaganda and the working of the Premium Bull System is based. The following Table shows the position of the number of Premium Bulls placed in the intensive cattle breeding areas.

	1936-37.	1937-38.
South Central Division ..	70	97
North Central Division ..	31	33
Southern Division ..	66	65
Northern Division ..	80	58
	247	*253

Shows and Cattle Rallies.—Cattle Shows and Rallies play a very important part in the propaganda of livestock improvement work. If we are to stimulate real interest amongst the local cattle breeders we must create healthy competitions by organizing local cattle shows in the heart of the cattle breeding tracts and recognising good work by offering good prizes. The pedigreed bulls put out in villages bring about improvement in the progeny ; but selection and proper care of offspring must follow before the improvement can be a permanent one. The Cattle Shows mainly serve this purpose. They are absolutely essential and are held annually in the pure cattle breeding areas. The breeders in these tracts expect us to give them the standard of excellence for the year. During the year 12 Cattle Shows were held as against 15 of the last year. In this year two big agricultural Shows were held in the Province, one at Sanand in Ahmedabad District and the second at Belgaum. Sanand being situated in the heart of Kankrej breeding area, the cattle section was the principal function of the Show.

* This includes 60 bulls which finished their period before the end of June 1938.

The Belgaum Show was held as a Central Agricultural Show for Karnatak Districts. As this place was out of reach for the cattle breeders, five preliminary rallies were held in area where pure-bred animals could be assembled easily. The prize winners of these rallies were given the expenses for bringing their animals to the Show. This enabled us to Collect the best of the animals bred in Karnatak. Out of the 865 animals shown in rallies 115 were selected; with these 95 local animals were admitted, making up the total of 210 exhibits.

Registration of animals.—The following table gives the registration of pure bred stock up to date :—

Division.	Number of animals registered up to 1936-37.	Number of animals registered during 1937-38.	Total up to the end of July 1938.
Northern	1,048	....	1,048
North Central	175	92	267
South Central	759	127	886
Southern	588	41	629
Total ..	2,570	260	2,830

During the year 48 villages have been surveyed for locating the pure stock and the owners would be persuaded to have their animals registered.

Application of Livestock Improvement Act.—This year the District Local Board of Sholapur agreed to the proposal of the application of this Act, in twelve villages in that District :—

(*i*) *Pandharpur Taluka.*—(1) Korti, (2) Gadegaon, (3) Umbergaon, (4) Shelva, (5) Kurvali and (6) Bohali.

(*ii*) *Sangola Taluka.*—(1) Mahud Budruk, (2) Chick Mahud, (3) Jawla, (4) Wadegaon.

(*iii*) *Malsiras Taluka.*—(1) Maloli and (2) Giroi.

In southern division two more villages, Kordur and Kittur have been taken under this Act and most of the undesirable bulls have been castrated. In Dhulia Taluka of West Khandesh six villages where pure Tapti khillar cattle are bred have been recommended to the District Local Board for the application of the Livestock Improvement Act. Names of villages :—

(1) Ajanale.
(2) Padaldi.
(3) Sadgaon.
(4) Ner (Nathri).
(5) Borivihir.
(6) Narvhal.

It was thought advisable to survey all the villages that are to be brought under this Act. A house to house census of the pure bred,

cross-bred and mongrel animals is being noted. In this year 48 villages have been surveyed. This would enable us to know how much improvement has taken place by Premium Bull and it also would be a first step in noting the progress when the undesirable bulls are eliminated under this Act.

His Excellency the Viceroy's Gift Bull Scheme.—It was found that the receiving of donations from the public for purchase of bulls did not solve the problem of its utilisation. In areas where cattle breeding is not valued, people would not come forward to maintain the bulls. To organise the work and to give out as many bulls as possible, District Committees under the Presidentship of territorial Deputy Directors were formed, the Divisional Inspector being one of the Members. A note instructing how to select a village and place out a bull, was prepared for the information of the District Agricultural officers.

The number of Gift Bulls made available during the year by the Livestock Section towards this scheme were 127 as against 90 of the previous year. These were as under :—

Northern Division	34
North Central Division	13
South Central Division	65
Southern Division	15
	127

General.—During the year under report the marginally noted additional District staff was sanctioned by Government to promote the work of livestock improvement. Two kamgars and one peon have been posted under each of the 4 Divisional Inspectors of Cattle Breeding to help and assist them in their activities in the District.

1 Assistant Livestock Expert to Government.
8 Kamgars.
1 Clerk.
5 Peons.

The entire staff under my control have worked very well indeed. I would, however, particularly like to mention that Messrs. Kolhe and Khot have both done good work. Messrs. Jamaspjina and Angadi deserve particular praise in connection with the Sanand and Karnatak Shows. The work of my Section has and is increasing rapidly daily and if this rate of progress is maintained I shall have to appeal to Government for more help in the way of staff and travelling allowance. I should like to bring to the notice of Government the excellent work done by Khan Bahadur Shaikh Mohiyuddin, B.Ag., J.P., District Deputy Collector, Kalyan Prant. The gentleman has always taken a keen interest in Agricultural matters and particularly Livestock. He was responsible for collecting large funds of money whilst in the Thana District in response to His Excellency the Viceroy's Gift Bull Scheme.

Since the starting of this Section, every effort has been made to see that subordinates deal justly and honestly with the public in all

ransactions. Whilst on tour in the district, I have made it a point to enquire with the villagers, if they have got anything to complain of, and I am pleased to say that uptil now I have not heard of any single case, which is detrimental to the characters of my subordinate staff.

Ever since the start of my work with the Government of Bombay, I have always made it my principle not to accept any help or assistance from the village headman whilst on tour, and have similarly impressed on my staff to be very strict in this respect and not to accept favours in the discharge of their duties.

Northcote Cattle Breeding Farm, Chharodi.

Personnel.—Mr. B. B. Jamaspjina held charge of the Farm throughout the year, except for 13 days on leave.

Season.—This year was an abnormal as regards the rainfall. The Monsoon came in two heavy lots, so that neither the Kharif nor the Rabi crop could be grown successfully. The total rainfall was 37·15″ against 15·48″ (or the average) of the last year. The first down-pour in Kharif made the fields inaccessible and helped the weeds to grow rank and the second lot of rain in Rabi season was so heavy that the seeds were washed away. The winter was exceptionally cold and the hot season started with abnormal heat in March.

Cultivation and Crops.—Although a year of plentiful rainfall, most of the plots remained unsown because of the inaccessibility for cultivation. Fifty-two acres were sown but the crops of chavali and bajari with muth gave a partial yield.

Silage.—Taking advantage of the rank growth of grasses due to heavy rainfall, all the silo-towers and pits, including the disused ones were filled. The total silage filled was 6,35,180 lbs. as against 1,73,558 lbs. of last year. Over 5 lakhs pounds of green grass was grass silage and the remainder being grass, maize and bajari mixture.

Hay-making.—A new policy of having an extra years' requirement of hay in stock as a precaution against bad years, was undertaken this year. The hay stacked was 6,95,632 lbs. More could not be cut due to want of funds and room in the barns. The old mowers gave often trouble and due to this the hay making and stacking charges came to Rs. 2-2-9 per 1,000 lbs.

Livestock.—The strength of the herd during the year stood as under :—

	Opening.	Closing.
Stud bulls	8	10
Cows	80	85
Heifers	56	54
Female calves	58	72
Young bulls	32	23
Small calves	48	38
Buffalo Bulls	41	40
Bullocks	57	58
	380	380

The total strength of the breeding herd remained the same but there has been a favourable increase in female calves. This is going to help in culling of the female stock which fall short of the standard of all the cows and heifers that calved during the year, only 4 did not yield milk at the pail, due to after effects of foot and mouth disease. 22 heifers calved during the year as against seven of the last year. Out of these 12 heifers have milked to the standard laid down on the farm and eight have been poor milkers and will be culled. The remaining 4 are under observation. The number of birth during the year was 77—33 males and 44 females—as against 63 during the previous year, the increase being due to increase in cows.

Deaths and Diseases.—The year under report was very unfortunate as regards the health of the herd. The foot and mouth disease broke out in August and its effects lasted till October. Due to the famine conditions of the previous year several calves were born weak and 13 succumbed to infantile maladies. Six deaths were due to vernomous bites.

Sales.—The total number of animals disposed off was 59 including one bull received as "Gift" from Sayla State. The total realisation was Rs. 5,488 and the average per head came to Rs. 93-0-3 as against Rs. 67-12-0 of the previous year.

Cattle received.—No outside cattle were received on the farm except seven buffalo bulls selected at Anand received for rearing for the buffalo Improvement Scheme.

Bulls issued.—Premium, Gift and Village Improvement Scheme Bulls. 29 bulls as detailed below were issued :—

Number of bulls.		District.
25	.. .. .. Ahmedabad.	(20 Gift Bulls, +1 Premium Bull +4 Buffalo Bulls).
3	.. .. .. Kaira	(3 buffalo bulls).
1	.. .. .. Broach	(1 buffalo bull).
29		

The Breeding Policy.—The policy adopted on the farm is to produce an economical animal with desired breed characteristics. Thus we have kept foremost in our mind, early maturity regularity of calving and type. During the year 24 heifers calved as against 7 of the last year. Out of these 24 heifers, 12 heifers have calved before the age of 4 years ; of these 12, again 4 have calved before 3 years and 3 months. The earliest has been the heifer Selar, at the age of 3 years and $1\frac{3}{4}$ months. The herd is divided into three groups, according to their standard of milking and draught qualities although all the cows give milk at the pail in addition to suckling their calves. The heavy milking herd and the herds having draught characters are headed by bulls possessing those special characters. However, a record of every female calf born is kept, as regards its maturity, interval of calving and milk giving capacity (*vide* the Appendix No. I and No. II).

The Milk production.—The total annual milk production was 1,33,623 lbs. as against 1,34,426 lbs. of the previous year. 94 cows individually produced the milk as against 76 cows of the last year. The decrease in milk yield is due to the unfavourable rainy season and the out-break of foot and mouth disease. The average milk yield per adult cow of the herd came to 1,476·9 lbs. as against 1,657·9 lbs. of the previous year.

The milk yielding capacity.—During the year under report 23 cows have yielded over 3,000 lbs. of milk in a lactation and have in addition suckled a calf. Three have gone over 4,000 lbs. and one touched 6,000 lbs. of milk per lactation.

Dairy Products and Disposal.—A statement (*vide*—Appendix No. III) gives the production and disposal of milk and milk products during the year 1937-38.

Cattle Breeding Farm, Bankapur.

Personnel.—Mr. A. B. Gadagkar was the Manager of the Farm throughout the year.

Season.—During the year there were no anti-monsoon showers and the tillage and sowing had to be started late. The Monsoon started by the middle of June as usual. Then except for a short break which allowed sowing, the land remained wet due to continuous drizzling up to the middle of August. This helped the weeds to grow rank. From the middle of August to end of September there was a complete break of 1½ months and this affected the crops seriously. Besides, there were no late rains and as a result the Rabi crops failed. The total rainfall was 21·60″ as against 26·41″ of the previous year.

Silage and Hay-making.—The grass lands had a very favourable season and 1,30,000 lbs. were utilised for silage as against 80,000 lbs. of last year. At the same time green grass was cut to the extent of 1,02,130 lbs. and fed in Monsoon. A small area of 10 acres was cut and turned into hay. The total hay stacked was 24,138 lbs. and the cost came to Rs. 37-2-9. Besides this, Ragi, Maize and Reava Laxuriana was turned into silage to the extent of 2,86,330 lbs.

Livestock.—The year opened with 155 herds of cattle and closed with 151, as shown below :—

	Opening.	Closing.
Stud Bulls	3	4
Cows	42	39
Heifers	28	37
Young Bulls	35	35
Cow calves	20	13
Bull calves	13	12
Bullocks	10	9
Buffalo Bull calves ..	4	2
	155	151

The herd has attained a high degree of uniformity and the colour and other points of confirmation are in consonance with the requirements of the Amritmahal breeders of the District. During the year under report 10 heifers came to season at 2 years and 9 months of ages and one at the age of one year and nine months. There were 28 calvings during the year as against 36 of the last year. Four bulls were supplied in the district on Premium System. Twenty-five animals were sold realising a sum of Rs. 1,303.

Diseases and Deaths.—Foot and mouth disease appeared on the farm in February and one calf died as a result of the serious attack. There were 7 deaths on the farm.

Fodder Crops.—The total area brought under cultivation was 30 acres. The details of crops grown is as follows :—

Maize.—The area under this crop was 9 acres and 10 gunthas which gave 1,32,630 lbs. of green fodder. This was ensilaged. A plot of 1 acre and 10 gunthas was kept for seed and yielded 2,230 lbs.

Ragi or Nagali.—The area under this crop was 6½ acres which yielded 78,000 lbs. of green fodder which was turned into silage. There was a ratoon crop which gave 5,430 lbs. of green fodder and 2,160 lbs. of semi dry fodder. This crop is very much liked by cattle both as green and silage.

Jowar.—2½ acres were sown under this crop. It was harvested when in flower and yielded 12,000 lbs. of Kadbi. Rabi, Jowar sown on an area of 4 acres after maize gave a yield of 4,000 lbs.

Reava-Laxuriana.—This is a new fodder crop introduced on the farm. It resembles maize and the yield is satisfactory. The yield was 72,602 lbs. from 5¾ acres.

Soya beans—Large Yellow variety.—One acre of this variety was sown on 3rd August 1937 and harvested on 14th November 1937 giving an out-turn of 580 lbs. of grains and 630 lbs. of chaff.

(*ii*) *Mammoth Yellow variety.*—2½ acres were sown under this variety on 3rd August 1937 and harvested on 14th November 1937. The crop was damaged by Rabbits and peafowls and the out-turn was 118 lbs. seeds and 195 lbs. chaff.

Bajari.—Half an acre of local Bajari variety was compared with the African variety for fodder purposes. The yields were 8,105 lbs. and 7,135 lbs. of green fodder respectively.

Kulthi.—Three acres of Kulthi was sown on 13th October 1937 but due to the failure of late rains the crop was affected. It was harvested on 26th January 1938 and the yield was 85 lbs. grain and 887 lbs. chaff.

Oats and Peas.—This was tried on the farm for the first time. Two acres and 30 gunthas were sown under this crop on 2nd October 1937, but the crop failed due to the failure of the rains.

Government Central Poultry Farm, Kirkee.

Personnel.—Mr. V. C. Charanti was the Manager of the Farm throughout the year.

Owing to the increase of the work, the post of the Assistant Manager was continued during the year.

Livestock.—There were 322 birds on 30th June 1938 as against 632 birds of the previous year (*vide* Appendix No. IV). The cause of this decrease is due to the outbreak of disease. The trouble started in November 1937 and lasted up to February 1938. During this time the farm was controlled by the authorities of the Veterinary Department to investigate the disease. Out of the total deaths of 333 of the year 236 took place during the above four months. The maximum mortality was in chicken, the adult death being only 70. The Veterinary authorities thought that the disease was Ranikhet and did their best to stop it. Out of the affected 363 birds only 17 survived. One interesting point regarding this outbreak was that the birds which were in the runs near the affected ones did not contract the disease.

Incubation.—The proper hatching season was lost to the farm this year due to the strict precaution taken by the Veterinary Department to stop the spread of the disease. The incubation was started on 28th June 1937 and ended on 26th April 1938 and this gave us 522 chickens during the year. The hatching percentage was 77·4 as against 80 per cent. of the last year.

The testing pens.—The testing pens erected on the Farm can only accommodate 36 birds. 18 White Leghorn, 6 White Wyandotte, 6 Rhode Island Red and 6 Australorp pullets were put in these pens on 15th October 1937. The result of the testing pens for nine months, is given in Appendix No. V. In the coming year fresh blood will be imported so that the size of the eggs will be increased in subsequent generations.

Distributions.—The following number of birds, chicken and setting eggs were sold during the year (*vide* Appendix No. VII) :—

——	Adult Birds.	Chicks.	Setting Eggs.
Government Institutions	120*	..	..
Private Persons	271	..	..
Institutions	42†	56	590
Total ..	433	56	590

* For rearing. † For table purpose.

The detailed statement by Divisions and Districts are given in Appendix No. VI.

General.—The income of the Farm was Rs. 3,754-12-0 as against Rs. 5,082-6-6 of the previous year. The decrease is due to the outbreak of disease with the result that the farm had to stop the sale as a precaution against spreading the disease (if that was found to be of a contagious type).

Teaching.—Sixteen students were trained on the farm this year (as detailed below) out of these three were Graduates. The Government is taking keen interest in educating as many persons as possible in poultry-keeping and have sanctioned funds for erection of students' quarters. Because of this facility it is decided to admit the students twice in the year :—

Serial No.	Name of the student.	Address.
1	Ismail Abdul Malik Ghole	Kimburli, taluka Mahad, district Kolaba.
2	Shankar P. Dhamale, B.Sc... ..	Agricultural College, Poona.
3	D. V. Sathe, B.Sc.	230, Sadashiv, Poona 2.
4	C. Nariman, B.Sc.	Indore, Sanyogita Ganj.
5	S. N. Bhavikatti	Dharwar Farm, Dharwar.
6	V. B. Nemade	Varangaon, Bhusawal.
7	Dhighorkar	Alibag, Kolaba.
8	V. G. Kamat	Belgaum.
9	M. G. Randive	Wada, district Thana.
10	V. G. Raut	Bordi, district Thana.
11	D. S. Patil	Jamner, East Khandesh.
12	G. C. Shaikh	231, Ganj, Poona 2.
13	Y. M. Mule	Mokhada, district Thana.
14	A. H. Khan	Government House, Poona.
15	B. K. Kole	Dhudhgaon, taluka Walwa, district Satara.
16	Ismail Ibrahim	Mandvi, district Surat.

Rural Uplift Work.

General.—Out of the four schemes started from the grants sanctioned by the Government of India, the Scheme for the encouragement of Poultry keeping is only retained.

SCHEME NO. 1—*Improvement of the Buffalo and its milk supply.*—The Scheme for the improvement of the milch buffaloes has been amalgamated in the general activity of the section and the four Kamgars sanctioned by the Provincial Government have been so placed that in addition to the general cattle improvement work they are instructed to look at this side of the Livestock industry as well. The original Warhadi breed of buffaloes has been very highly developed as a milking breed in Pandharpur and now has come to be named after that town. A detailed record of its performance of 111 pure-bred animals was kept during the year under report and it was found that 54 per cent. of buffalo cows gave more than 3,000 lbs. of milk in a lactation and 35 per cent. gave between 2,000 lbs. to 3,000 lbs. and the remaining being below 2,000 lbs. The highest yielder gave 6,738 lbs. The milking period on average comes to nine months. The dry period extends from 3 months to six months only. The latter is due to Gaolies not showing the bull early so as not to minimise the milk yield when the buffalo is in calf.

There is no stall-feeding done by the breeders of this buffalo. Grass lands and standing kadbi crops are purchased co-operatively. When these are not available, kadbi is fed to animals outside the town under trees adjoining the river. The cost of upkeep per year for one buffalo has worked out to Rs. 175.

In the rural areas of Khandesh, there are two types of milch buffalo keepers :—

(*i*) Farmers who keep the buffaloes to utilise the residues of cereal and pulse crops grown, for a subsidiary source of income for ghee or khawa.

(*ii*) Gowlies who are generally not owning lands and solely resort to forest grazing for fodders to carry on the trade of country butter manufacture.

With a view to find out what kind of buffalo pays a farmer, weekly data regarding milk yield, fodders fed and concentrates given to 24 buffaloes was collected for 36 to 39 weeks at Bhadli village in Jalgaon Taluka during the year under report. The salient features that emerge from the study of the data thus collected are :—

(*i*) Buffaloes yielding 2,970 lbs. in a period of 36 weeks gave profit of only Re. 1-3-0, i.e., Buffaloes yielding less than 3,000 lbs. under Bhadli conditions are not paying.

(*ii*) Buffaloes yielding 3,866 lbs. during the same period, i.e., 36 weeks, gave a profit of Rs. 30.

Note.—The profit and loss has been calculated by considering the following factors :—

(1) Price of concentrates at purchased price.

(2) Price of fodders at Saleable price in the village.

(3) Rate of milk 20 lbs. per rupee as prevailing in the village for the whole year round for khawa making.

(4) No allowance is made for the wages of the buffalo keeper nor for the manure produced (10 to 12 carts).

(*iii*) The buffaloes which just met both ends cost as under :—

Rs.	a.	p.	
35	9	0	for cotton seed.
99	15	0	for the fodders and grasses.
135	8	0	

(*iv*) The buffaloes which made a profit of Rs. 30 cost as under :—

Rs.	a.	p.	
43	4	0	for cotton seed.
108	0	0	for fodders and grasses.
151	4	0	

(*v*) At Bhadli village all the buffaloes are stall-fed and the manure produced is well cared for.

(*vi*) The majority of the buffaloes are of the "Malvi" type imported from Central India from stations such as "Bercha", Sirohi Cantonment, etc.

(*vii*) The purchase price of the buffaloes varied from Rs. 80 to Rs. 100.

(*viii*) The average fat per cent. of milk works out 7·5 to 8; whilst lowest tested was 6 per cent. and highest 10 per cent.

Improvement of the Buffalo in (Anand Taluka) Gujerat.

In Gujerat in Anand taluka three villages (1) Samarkha, (2) Kasor and (3) Ajarpura were selected for the purpose. In all 101 buffaloes were selected for milk record. Of these 31 selected for milk record. Of these 31 buffaloes were sold and four were discontinued, leaving 66 buffaloes for the purpose of our work. The milk recording and testing was done periodically. Buffaloes yielding milk over 3,500 lbs. and over were 45 out of 66 e.g., 67 per cent. The highest milk yield for the unfinished lactation for a period of 10 months has been 5,860 lbs. The average fat per cent. recorded was 8 per cent.; the highest was 12 per cent. and the lowest 6·2 per cent.

Seven Buffalo bull calves from high yielding dams were purchased during the year and received at the Chharodi Farm for rearing for issuing when mature for breeding purposes in the district. Eight buffalo bulls were issued during the year. In the Karnatak three centres, e.g., Athani,

Bagalkot and Bijapur were selected for the purpose of recording and testing. In all 206 buffaloes were selected as shown below :—

Athani	..	15 buffaloes of local type.
Bagalkot	..	86 buffaloes of Pandharpuri breed.
Bijapur	..	105 buffaloes of Pandharpuri breed.
Total	..	206

It was found that 52 per cent. of the Pandharpuri breed yielded milk 3,500 lbs. and over while only 13 per cent. of the local buffaloes attained that standard. The average fat percentage was 7·5. The highest was 9·3 and the lowest 6·2 per cent. The cost of keeping a good Pandharpuri buffalo works out Rs. 168 (Rs. 112 for concentrates and Rs. 56 for the fodders). Two buffalo bulls selected from high yielding dams were located during the year.

SCHEME NO. 2—*Improvement of poultry in villages.*—The results of the improvement of village poultry by means of introduction of pure bred cocks have been very promising, in spite of the diseases and the general ignorance of the cultivator to look after the pedigree stock given to him. The pure bred cocks are mostly given in a concentrated area so that the work can be supervised by one Inspector who is sanctioned for this scheme. Besides this the Inspector is sent out to advise the starting or working of poultry centres started in the Districts. This year he has been able to arrange poultry stalls in all the Agricultural Shows held in the Province.

The details of the cocks put out in each District is as follows :—

District.	White Leghorn.	Rhode Island Red.	Black Minorca.	Australorp.	White Wyandottes.
Poona	9	..	..	..	..
Satara	71	7	20	10	..
Ahmednagar	28	..	..	..	..
Belgaum	24	..	..	..	..
Kolaba	..	..	..	..	..
Thana	1	20	..	..	..
Sholapur	5	4	..	1	7
Dharwar	5	..	..	..	..
Total ..	143	31	20	11	7
Grand Total ..	212				

SCHEME NO. 3—*Encouragement of pedigree poultry keeping in villages by premia to poultry farms.*—Under this scheme six farmers were helped with the premiums for poultry housing and purchase of foundation stock as under :—

Serial No.	Name of the Premium holder.	Address.	Kind of Premium.	Amount.
				Rs.
1	Krishna Govind Bogir ..	Ellur, district Satara.	Housing ..	100
2	Mr. Baburao Balaji Borude.	At Rui, Supa, taluka Parner, district Nagar.	Do. ..	100
3	Raosaheb Balasaheb Deshmukh.	At and Post Javala, district Sholapur.	Do. ..	100
4	Hari Sidhram Bhopte ..	At Shiwade, Post Umbraj, district Satara.	Egg and Fowl.	50
5	Sidhram Shiwappa Kore ..	At Shelagi, Post Sholapur.	Do. ..	75
6	Mahadu Sawalaram Bhujbal.	At and Post Talegaon Dhamdhere, district Poona.	Do. ..	75

The result of the improvement in quality of eggs was tested at Sangola Bazaar in Sholapur District by grading a basket of eggs from the general purchase done by egg merchants. The results given below will show that 62 per cent. eggs are above the average of the Desi hen and 10 per cent. of the eggs have reached the standard of the pure bred birds :—

Standard..	Standard of pure bred birds.		Standard of Cross-bred birds.		Standard of Desi birds.		
	Tolas.		Tolas.		Tolas.		
Weight	5	4½	4	3¾	3½	3	Below 3 Tols.
Number of Eggs ..	3	51	151	163	101	23	8
Percentage ..	0·6	10·2	32·2	32·6	20·2	4·6	1·6

District Poultry Centre Scheme.—This scheme was initiated by B. S. Patel, Esqr., B.Ag. N.D.D., N.D.A., I.A.S., the then Livestock Expert to Government, Bombay Province, Poona, and was forwarded to all the Collectors for making available the necessary funds to run the same if it possibly could be done from the Village Improvement grants at their disposal. The idea of this scheme is to concentrate the Poultry

Improvement work in one centre in a District to get useful results and secondly there must be some one to educate and guide the village poultry people from day to day.

The Collectors of Kaira, East Khandesh and Sholapur have approved the above scheme and the actual work was started at Anghadi, Varangaon and Khardi of the three Districts respectively. The work at Kaira had to be stopped due to want of sufficient grants. Varangaon centre is running quite smoothly. At the Khardi centre, Poultry houses and running yards have been erected and the fowls will shortly be introduced. The same work will be taken in Kolaba and Thana District in a short time.

The Infants and Public Supply Company, Limited, Palghar.

Mr. P. P. Mistri, the Managing Director of the Company is exerting his best to reorganise the Dairy farming but unfortunately the Company has not had very much time to bring into operation the suggestions made. The total strength of the herd was 425 as against 438 of the last year. The drop in numbers is due to an outbreak of disease which took a toll of 29 deaths. The diseases suspected were H.S., Sarrha and Anthrax. Besides there were 24 cases of abortion. It is difficult to ascertain what these abortions were due to but possibly they are nutritional, better and correct feeding with the addition of mineral salts may stop this trouble. The company produced and despatched 369,885 lbs. of milk to Bombay during the period of 9 months from July 1937 to March 1938, as against 365,438 lbs. for the corresponding period of the previous year.

It has been suggested to the Company to construct a large silo for supply of succulent fodder to increase milk yield and thus reduce cost on feeding charges and yet keep their stock in thriving condition. It has also been suggested to the Company to allot to the Dairy Farm a definite budget annually based on the average capital and recurring expenditure for the last five years. The complete accounts of this budget allotment to be maintained at Palghar. This will give the Inspecting Officers a better chance to advise.

Bombay Gowrakshak Mandali.

The Kandivli Farm with its sub-station at Betegaon made very good progress during the year under report. The Farm was managed by Mr. K. K. Shukla, B.Ag.

Crops and Fodder.—New land has been opened at Betegaon to increase the area under green fodder. This year 20 acres of land was under irrigation and the milking herd was supplied with green fodder throughout the year. In addition to this grass was cut to the extent of 60,000 lbs. for ensilage and 18 lacs as hay. Twenty acres of gowar was sown and this gave 28,000 lbs. of green fodder and 24,800 lbs. dry kadbi. It was found that feeding kadabi in winter was helpful in increasing the milk yield of the herd and the Mandali has decided to increase the area under this crop.

Livestock.—A very fine herd of Gir cattle is being built up on the farm. The number of pure bred animals has increased from 119 to 170. This year 18 cows have given more than 4,000 lbs. of milk in a lactation as against 7 cows last year. One outstanding cow milked 7,694 lbs. in 495 days. On an average 45 cows were in milk. During the year 364,182 lbs. of milk was produced as against 178,712 lbs. of the previous year.

Bulls.—This year 15 bulls have been given out, 16 are ready to go out.

Cattle Dip.—After seeing the good results of dipping farm animals the Mandali helped the agriculturists by allowing the use of their dip free of cost.

Buildings.—A new Gowshala was constructed at Kandivli at a cost of Rs. 6,200 to accommodate 36 animals of the breeding section. Besides two wells have been dug and fitted with pumping sets for irrigation purposes at a cost of Rs. 25,000.

General.—During the year under report, the Mandali undertook His Excellency the Viceroy's Scheme of salvage of dry cows and the buffaloes from Bombay slaughter house, the report of which is sent to the Secretary, Imperial Council of Agricultural Research, New Delhi. During the year the Mandali supplied 19 Waggon loads of grass (180,500 lbs.) to the fodder famine areas in the Ahmedabad District in the month of June 1937.

Taluka Development Association Cattle Breeding Farms.

1. The Pimple Farm for the Nimar breed worked by the Taluka Development Association, Jalgaon, has been making a steady progress. The Collector of East Khandesh allotted the following grants:—

Rs.	
2,000	for construction of the cattle byre.
900	for construction of cattle dip.
125	for purchase of an Incubator.

The farm has 115 heads of Nimar cattle consisting of 45 cows; two breeding bulls, 39 heifers and 29 bull calves. The Farm supplied eight breeding bulls to His Excellency's Gift Bull Scheme and three Premium Bulls. A batch of one dozen bulls is ready for putting out. The Nimar breed is purely a work-animal. During the year, 23 cows have been milked from two teats, leaving two teats to the calves. The highest milk obtained per day from two teats was 6 lbs. during the flush period. It is, thus, hoped to evolve a kind of dual purpose Nimar breed, which is very much liked in Khandesh. During the year 76 acres were cropped, of which 2/3rd area was under fodder crops and 1/3rd area under cotton and groundnut. Besides, the farm has nearby an area of 400 acres of

good grass lands which is leased out yearly at Rs. 555 from the Forest Department. One-third of this area is used for grazing and the remaining two-third is used for cutting grass, yielding about 2¼ lakh pounds of grass. The Jamnapuri goats on the farm are doing well and the results of their milking capacity are awaited. The President of the Cattle Farm Mr. T. B. Bhoite with his Secretaries Messrs. Chitre and Savant and the Taluka Development Association Overseer Mr. Salunke deserve congratulations for watching the interest of the farm.

2. The Gangapur Farm managed by the Taluka Development Association, Jamner, is also working with the Nimar breed. The farm is making steady progress under its President, Mr. Nana Namdev Patil and the Vice-President Mr. Ramchandra Motiram Patil. The Mamlatdar, Mr. G. M. Deshmukh is taking a very keen interest in the farm and had it not been for his personal interest it would have been rather difficult to sustain the non-official interest in the farm. The farm was fortunate in getting a grant of Rs. 4,000 from the Collector of East Khandesh for deepening of well and the pumping set. The farm has 59 heads of Nimar Cattle consisting of 22 cows, 2 breeding bulls, 22 heifers and 13 bull calves. The farm supplied four breeding bulls during the year and batch of 4 bulls would be ready for putting out during the year. 14 Nimar cows were milked on the farm during the year, keeping two teats for the calves. The highest milk yield obtained per day from 2 teats was eight pounds. The farm has very little area of good lands for growing fodders. The Revenue Department has given an area of about 70 acres at nominal rent. This area is about ½ mile from the farm and is very poor, stony and Murmad. During the year under report this area was ploughed and put under fodder crops. This area yielded about one lakh pounds of fodder. The farm has no separate grazing lands allotted to it. Efforts are being made to secure about 200 acres of grazing land near the farm from the Forest Department.

3. The Sangvi Cattle Breeding Farm worked by the Taluka Development Association, Shirpur, has received a serious setback due to contagious abortion. Unfortunately no satisfactory remedy has been found to stop this. The farm keeps Tapti Khillar cattle and the herd consists of 24 cows, one breeding bull, 17 heifers and 15 bull calves. Four bulls were supplied during the year. In all there were six abortions on the farm.

As per Government Resolution, Revenue Department, No. 377/33 of 24th March 1936 the Government of Bombay have approved of a scheme to subsidise the three Cattle Breeding Farms in Khandesh at the rate of rupee one for every three rupees spent on the management of the farm subject to the maximum of Rs. 1,000 a year and subject to the grant not to exceed the deficit in the working expenses of the farm. The Cattle Farms at Pimple and Gangapuri are fortunate to receive yearly grants of Rs. 1,500 each from the District Local Board, East Khandesh.

Scheme for Research in Poultry Husbandry financed by the Imperial Council of Agricultural Research.

The Scheme is working at the following three centres :—

(1) Kirkee Centre in the Poona District under the Livestock Expert to Government, Bombay Province, Poona.

(2) Vadala Centre in the Ahmednagar District under Rev. R. W. Fairbank, American Marathi Mission.

(3) Ankleshwar Centre in the Broach District under Mr. I. W. Moomaw, Principal, Vocational Training School, Ankleshwar.

The above three centres are under the supervision of the Livestock Expert to Government, Bombay Province, Poona, and the work done during the year at these centres is described in brief below :—

(*i*) *Kirkee Centre*—

(1) *Strength of flock.*—There were 448 birds on 30th June 1938 as against 341 of the previous year (*vide*—Appendix No. VIII).

(2) *Health of flock.*—Unfortunately "Ranikhet" disease prevailed on the farm for four months from November 1937 to February 1938. In spite of the remedial measures adopted by the Veterinary Department, 300 chickens were lost. The Ducks, however, were unaffected by this disease.

(3) *Testing the laying capacity of different breeds of poultry.*—This was accomplished by "Trap-nesting" the egg record of the following breeds of poultry and are summarized under Appendix No. IX.

(1) Light Sussex.
(2) Black Minorca.
(3) Chittagong.
(4) Necked Neck (Phirangi).
(5) Khaki Cambell Duck.
(6) Indian Runner.

In addition to the testing of the above breeds, their habits and behaviour were noted. It was found that the Light Sussex needed more shade in the summer than the other breeds, meaning that they do not stand the heat very well. The Black Minorca was found to do better on open range than when confined. The breed under close confinement acquired the habit of feather pricking and cannibalism. This breed was found to be hardy. The Chittagongs were found to be very good foster mothers. During the period of 114 days under observation, two Chittagong hens were broody for 86 and 62 days respectively. The Cockerels are leggy resembling the Game. The chicks (15) hatched out from the setting of eggs received from Bengal showed no uniformity in combs—some having single combs and others having pea-combs. The single comb pullet (Wing Band No. 190) has done well in trap-nesting ; but the size of the egg is small. The other pullet (Wing Band No. 189) having pea-comb was found more broody and laid a less number of eggs, but the size of the eggs was better. This breed is difficult to control and needs a high fence to keep it within bounds. 20 Chicks from Necked-neck parents were

hatched during the year. The chicks are small in size and slow growers, not uniform in colour ; some chicks had necked-necks while some had fully covered necks. The birds are hardy and were found to stand up heat during the Ranikhet disease outbreak. Khaki cambell ducklings were found to be quick growers.

Incubation.—The hatching of eggs was disturbed due to the prevalence of " Ranikhet " for four months from November to February. 713 chicks and 45 ducklings were hatched during the year. The cost of hatching for every effective healthy chick obtained, works out anna one and pies 5·34. The results of hatching for the different kinds of breeds were as under :—

Name of breed.	Number of eggs put in Incubator.	Healthy chickens obtained.	Percentage.
White-leghorn	442	237	76·5
Rhode Island Red	563	264	63·9
Light Sussex	164	50	41·0
Black Minorca	261	101	51
Necked-Neck	72	37	77
Chittagong	152	24	60
Indian Runner	182	24	36·4
Khaki Cambell	226	21	35·7
	2,061	758	..

Feeding Experiments.—Two feeding experiments were carried out during the year. The first experiment was to test the all grain feeding as is done in villages in comparison to grain and mash feeding with animal protein included. The experiment started on 10th August 1937 and ended on 9th December 1937 with equal number of White Leghorn pullets in the first instance covering a period of 122 days. Three reversals were done—one of 90 days and two of 40 days each to test the feeding. Thus the experiment covered a total period of 292 days.

Summarising the results, it has been found that the birds receiving the grain mixture as is usually done in the villages laid on an average 110 eggs per bird, while those on the grain and mash feeding with animal protein laid 173 eggs on an average. There was no appreciable difference in the weight of eggs which was 1·82 and 1·88 respectively. As for the body weight the birds on the latter feeding gained weight by 9·2 per cent. while those on the former lost weight by 2·4 per cent. The cost of producing eggs per dozen was annas 4 and pies 7·55 for the first-feed and

annas five and pies 0·75 on the 2nd feed. The mortality of birds was 20 per cent. and 15·4 per cent. respectively during the course of the experiment covering 292 days.

Feeding tests were carried out to ascertain effects under free range versus limited range for a period of 240 days from 15th October 1937 to 20th June 1938. It is common in villages for poultry keepers to let their birds have free range to reduce the cost of feeding. White Leghorns and Rhode Island Reds were tried for the purpose. The test covered 100 days at the beginning, supplemented with two reversals one of 100 days and the other of 40 days, thus covering a period of 240 days for each of the breeds mentioned above. The results obtained so far are in favour of free range for the White Leghorn and limited range for the Rhode Island Reds.

Laying Battery Experiment.—The Laying battery consists of case divided into eight compartments in the laying battery, each measuring 18″ × 18″ ⋉ 18″. These were used to test the laying capacity of different breeds in order to see how they do in a confined area. The scarcity of space is generally felt in big cities and hence this was tried on —

4 pullets of White Leghorn.
2 ,, ,, Rhode Island Red.
2 ,, ,, Black Minorca from 20th March 1938 to 30th June 1938.

The results reveal that both White Leghorns and Black Minorcas lose weight by 16 and 12 per cent. though the laying capacity is maintained; while the Rhode Island Red gained weight by 4·7 per cent. deepened in colour and the laying capacity was better. The first two breeds mentioned acquired the habit of feather-pecking.

Testing the suitability of different houses for poultry keeping in villages.—Two types of poultry houses of the cheapest available materials were tried during the year.

House No. 1 measuring 10′–10″ × 6′–9″ × 7′ was built of Mulberri plant branches for side walls, with roofing of toddy palm leaves and gunny bag. All side walls were white washed and painted with hot coal tar for 3′ in height from the ground level for prevention of ticks. The tar was applied every three months. Two perches with oil cups were provided. This costed Rs. 23 for construction. Twenty birds were kept in this house for observation and was found quite sanitary and comfortable in all seasons.

House No. 2 was constructed from Aloe (or Agave) leaves, measuring 9′ × 5½′ × 4½′ at a cost of Rs. 5-1-0. The roof of the house shrank very rapidly during the hot months and was replaced thrice with fresh leaves. The house does not need repairs in the rainy and winter seasons. This house was found to be free from ticks. Chickens of all breeds were reared to adult stage in this house. In order to prevent losses from rats, Mongoose and wild cats, this house requires to be wire-netted all round.

Financial position.—The expenditure including the pay of the Manager and the Assistant Manager (which was Rs. 720) was Rs. 3,043-7-6 while the income from sale proceeds was Rs. 2,327-0-0. The receipts were affected due to the prevalence of the disease for 4 months on the farm.

Supply of Pedigree birds for breeding.—During the year 150 birds, hens and cocks and 15 ducks costing Rs. 856 were supplied in the districts, Native States and outside Bombay Province.

Supply of setting eggs for hatching.—295 setting eggs (241 fowls) worth Rs. 60-4-0 and 54 Duck worth Rs. 13-8-0) were supplied to *bona fide* farmers at concession rates; while 140 setting eggs were sold to professional poultry keepers.

IMPERIAL COUNCIL OF AGRICULTURAL RESEARCH POULTRY BREEDING SCHEME.

Ankleshwar Centre.—(Broach District)—

(*i*) *Strength of Flocks.*—There were 220 birds as under:—

Breed.	Adult Fowls.		Chickens.		Total.
	Male.	Female.	Male.	Female.	
Rhode Island Red ..	7	16	27	25	75
White Leghorn	14	12	26	32	84
Country Selection No. 1 ..	4	19	15	23	61
Total ..	..	..	..	..	220

(*ii*) *Health of flock.*—Roup was the only disease that caused serious trouble during the year in spite of the remedial measures adopted by the local Veterinary Officer. All birds were vaccinated regularly for chicken pox as a preventive by the Veterinary Officer. There were no cases of chicken pox during the year.

(*iii*) *Testing the laying capacity of different breeds of poultry.*—This was done from 1st December 1937 to 31st May 1938, with results as under:—

Breed.	Average number of eggs per hen per month.	Average weight of egg.	Highest egg record for six months.
	Ozs.	Ozs.	
Rhode Island Red	13½	1⅞	112 eggs.
White Leghorn	11¾	1¾	94 „
Country selection	7½	1¼	74 „

(*iv*) *Incubation.*—Hatching of eggs in the incubators was done at two different seasons :—

1. *Monsoons.*—July to September. During this period the atmosphere is humid and there is little variation in temperature.

2. *Winter Season.*—November to January. During this period the days are often warm and night cool. It is common for the temperature to vary from 48-F° at 3 a.m. to 95-F° at 2 p.m. At this season the air is exceedingly dry. The hatches taken during the Monsoon were in general more successful than the one in the winter. The results are summarised as under :—

Season.	Number of eggs set.	Infertile.	Germ or chick died in shell.	Number of chicks hatched.	Per cent. of hatching.	Cost of hatching per chick.
					Per cent.	As. p.
Monsoon ..	107	24	20	63	75	4 11
Winter ..	171	51	52	68	56	7 1

(*v*) *Feeding Experiment.*—Grain feeding as is usually done in villages in comparison to grain and mash feeding with animal protein was tested during the year on two lots of 10 day old chicks from 1st February 1938 to 31st May 1938. The results are tabulated below :—

Lot No.	Average lot of May 1931.	Average feed cost from 1st February to 31st May.	Feed cost per pound of gain.
		Rs. a. p.	Rs. a. p.
1	2 lbs.	0 7 3	0 3 8
2	1¼ „	0 4 6	0 3 7

While the cost per pound of growth is nearly the same, there was a marked improvement in the appearance of the birds of lot No. 1 over those of lot No. 2.

(*vi*) *Testing the suitability of different houses for poultry keeping in the villages.*—From experience gained in previous years it has been found that one inch expanded metal cut to desired dimensions for the sides and ends, is an economical and suitable material for houses in this area. Whether attached to a teak wood frame or fastened at the corners by angle iron, there is little opportunity for vermin to hide in them. With the lower edge of the metal embedded 2 inches in concrete there is little danger of theft or injury to fowls and a sanitary floor could also be

provided. Such as house 4′ × 6′ with teak wood frame (close joints tarred) corrugated metal roof and cement floor costs about Rs. 30 for labour and material. Round holes are made in the cement floor at proper distance to accommodate the rods for tick proof perches. Other types of houses are in use, but the one described above seems most suitable. During hot weather they are open from all sides, while in Monsoon a canvass or gunny may be drawn across one or more sides as needed. While ticks are a serious menace to the villages round about, they have so far given no trouble at the centre.

Imperial Council of Agricultural Research Poultry Research Scheme.

Vadala Centre (Ahmednagar District).—

(*i*) *Strength of flock.*—There were 68 birds as shown below :—

Breed.	Adult birds.		Chicks.	Total.
	Male.	Female.		
White Leghorn	24	33	..	57
Black Minorcas	5	4	2	11
				68

(*ii*) *Testing the laying capacity of different breeds of poultry.*—The White Leghorn and the Black Minorca were trapnested during the year and the results are shown in Appendix No. X.

(*iii*) *Incubation.*—Both artificial and natural incubation was done in the months of November and December 1937, with results as under :—

Kind of Incubator.	Number of eggs set.	Infertile.	Germ or chick died in shell.	Number of chicks hatched.	Percentage of hatching.
Iron Clad No. 1 ..	33	9	3	21	95·4
Do. No. 2 ..	38	4	18	16	57·1
Do. No. 1 ..	36	5	25	6	24
Do. No. 2 ..	38	11	15	12	44·4
Broody hen	12	2	1	9	90

The average cost of hatching a chick works out annas two pies nine in the artificial incubator.

Sheep Breeding Research Station.

The Sheep Breeding Farm financed by the Imperial Council of Agricultural Research was started in November 1937. The farm is situated on the Bhamburda forest area on the Western part of Poona. It consists of about 280 acres of grazing area. The object of the farm is to evolve a type or a breed of sheep which will be superior to the present indigenous sheep of the Bombay Deccan ; also to study the reaction of the Merino and its by-bred progeny to the Deccan surroundings. Along with these main objects, information on the points of sheep management are to be studied. As the work was started late in the year every little can be reported on the breeding and other aspects of the farm. The major portion of period was taken up for the clearing of the forest land and erection of buildings. The foundation stock of sheep consists of two breeds, e.g., the Merino and the Deccan.

The Merino Sheep of Wangeuella strain were purchased in January from South Africa. These consist of 10 ewes, 2 rams and three rams were presented. The progress of the Merino sheep is a hopeful one and three pure bred lambs are born. A flock of 100 ewes and 2 rams of Deccani sheep are to be purchased as a foundation stock for the farm. 41 ewes and one ram have been brought on the farm up-to-date. Due to the heterogenous nature of the Deccani sheep, it has been very difficult to get the whole lot and it would be sometime before the total number of these sheep are collected, as we must start the work with a flock of as even in quality and characters as is possible.

APPENDIX I.

Statement showing age at 1st calving of the Heifers that calved during the year 1937–38 compared with their Dams.

Daughters.					Dams.			
Serial No.	Name.	Brand No. and date of birth.	Sire.	Age at first calving.	Name.	Brand No. and date of Birth.	Sire.	Age at first calving.
1	Samli..	6 18-3-33	Chandli 20·28.	4–1½	Samli..	26 15-9-24	Mohan ..	3–7½
2	Selar ..	5 14-3-33	,, ..	4–1½	Selar ..	29 11-5-21	Kachari..	4–2½
3	Vanar .	3 1-3-33	,, ..	4–2½	Vanar .	1 1-1-25	Senduri..	4–5½
4	Vanzari.	7 21-4-33	,, ..	4–1½	Vanzari.	27 25-4-21	Kachari..	4–10½
5	Bodli..	20 10-12-32	,, ..	4–6½	Bodli..	324 24-5-17	Moti ..	6–11½
6	Ujol ..	9 11-5-33	,, ..	4–2½	Ujol ..	4 18-1-26	Mohan ..	4–3
7	Vanar .	14 20-7-32	,, ..	5–¾	Vanar .	10 16-4-20	Nawab ..	5–2
8	Renchhi	14 12-10-35	,, ..	4–2¾	Renchhi	38 17-12-21	Mohan ..	3–11½
				34–7½				37–5½
			Average..	4–3¾		Average ..		4–8
9	Lilor ..	13 12-7-32.	Waghen 12·28	4–8¾	Lilor ..	9 25-1-22	Mohan ..	4–0
			Average..	4–8¾.		Average ..		4–0
10	Rozi ..	1 18-1-33	Padol 8·29 ..	4–2¾	Rozi ..	40 13-12-26	Faterio ..	4–4½
11	Bodli..	12 24-6-33	,, ..	3–11½	Bodli..	33 27-5-26	Mohan ..	3–10½
12	Laxmi .	11 10-6-33	,, ..	4–0	Laxmi .	34 9-6-21	Kachari..	4–6¾
13	Nasal..	10 1-6-33	,, ..	4–1½	Nasal..	7 2-4-29	Kachari..	4–2¾
				16–3½				16–11½
			Average..	4–¾			Average..	4–2¾

APPENDIX I—*contd.*

Daughters.					Dams.			
Serial No.	Name.	Brand No. and date of birth.	Sire.	Age at first calving.	Name.	Brand No. and date of birth.	Sire.	Age at first calving.
14	Chanothi.	6 .. 7-2-34	Meghan 15·29 ..	3-3	Chanothi.	1 .. 30-1-24	Mohan ..	3-3½
15	Patoli.	24 .. 20-12-34	,,	3-2½	Patoli .	18 .. 1-6-25	,,	3-8½
				6-5½				6-9½
			Average..	3-2½			Average..	3-4½
16	Nasal..	15 .. 7-11-33	Ujol .. 11·31	3-6½	Nasal..	35 .. 18-11-24	Senduri..	4-4½
17	Ujol ..	1 6-1-34	,, ..	3-6½	Ujol ..	4 .. 23-2-29	Farshi ..	3-10½
				7-½				8-3
			Average..	3-6½			Average..	4-1½
18	Selar ..	12 10-4-34 ..	Nasal 3·29.	3-1½	Selar ..	29 11-5-21 ..	Kachari..	4-2½
19	Kachari.	18 18-6-34 ..	,, ..	3-2	Kachari	32 3-6-20 ..	Moti ..	4-8½
				6-3½				8-10½
			Average..	3-1½			Average..	4-5½

APPENDIX I—*contd.*

Serial No.	Daughters.				Dams.			
	Name.	Brand No. and date of birth.	Sire.	Age at first calving.	Name.	Brand No. date of birth.	Sire	Age at first calving.
20	Lili ..	13 1-9-33	Ravti..	3—9½	Lili ..	26 27-10-27	Todar ..	4—6½
21	Renchhi	9 4-3-34	30·29 . „ ..	3—5½	Renchhi	33 27-11-25	Bhim ..	4—6
22	Samli...	7 18-2-34	„ ..	3—7½	Samli..	24 29-10-28	Kachari.	4—3½
23	Boked .	19 21-8-34	„ ..	3—6½	Boked .	25 10-11-28	Todar	4—3
				14 5½				17 6½
			Average.	3—7½			Average.	4—4½
24	Santu..	17 18-6-34	Nasal 22·30.	3—8½	Santu..	14 18-12-30	Pasvo ..	3—6
			Average.	3—8½			Average.	3—6

APPENDIX II.

Statement showing regularity in calving in Originals, F-1, F-2, F-3 and F-4 generations during the year 1937-38.

Generations.	Number of cases.	Age at first calving.	Interval between calvings.							
			I and II.		II and III.		III and IV.		IV and V.	
		Y. M.	Y.	M.	Y.	M.	Y.	M.	Y.	M.
Originals ..	103	5 7½	1	10½	1	8½	1	7½	1	5¾
F-1 ..	162	4 4¾	1	6½	1	4	1	2½	1	2½
F-2 ..	80	4 0	1	4¾	1	3½	1	1½	1	2
F-3 ..	12	3 9	1	4½	1	3	0	10¾	1	1¾
F-4 ..	2	3 10	..		..		..		..	

E. J. BRUEN,
Livestock Expert to Government,
Province of Bombay, Poona.

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APPENDIX III.

Statement of Milk and products, their production and disposal during the year 1937–38.

Item.	Quantity.	Value.	Remarks.
	Lbs. Ozs.	Rs. a. p.	
Milk produced ..	133,623 0	....	
Milk sold	21,117 0	659 14 6	At Re. 0-0-6 per lb.
Milk and colostrum fed ..	3,119 4	97 7 7½	Do.
Milk used for test ..	678 12	21 3 4½	Do.
Separated milk produced ..	98,605 12	256 12 6⅞	At 24 lbs. per anna.
Separated milk fed ..	98,605 12	256 12 6⅞	Do.
Cream produced	7,616 12	....	....
Cream churned	7,634 8	....	....
Ghee produced	3,528 4	....	....
Ghee sold	3,533 4	2,705 8 5¼	At Re. 0-12-3 per lb.
Ghee fed	21 8	16 7 4½	....

APPENDIX IV.

Statement showing the strength of flock on the Government Central Poultry Farm, Kirkee, during the year 1937–38.

Serial No.	Breed.	Cocks.	Hens.	Cockerels.	Pullets.	Chicks.	Total.
1	White Leghorn ..	1	2	19	38	77	140
2	White Wyandotte ..	1	3	2	10	..	16
3	Rhose Island Red ..	..	12	7	17	40	76
4	Australorps ..	..	6	10	8	58	82
5	Aseels	..	..	..	1	..	1
6	Well Summer ..	..	..	4	2	1	7
	Total ..	2	26	42	76	176	322

E. J. BRUEN,
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APPENDIX V.

Statement showing the individual egg laying record of the Testing Pen Hens on the Government Central Poultry Farm, Kirkee (from 1st October 1937 to 30th June 1938 both days inclusive), during the year 1937–38.

Pen No.	Hen No.	Breed.	Total number of eggs laid in 9 months.	Total weight of eggs.	Average weight of an eggs.	Remarks.
				Ozs.	Ozs.	
1	1	White Leghorn	..	..	..	Died.
2	3	Do.	162	350	2·16	
3	5	Do.	151	300	1·98	
4	7	Do.	160	329	2·05	
5	9	....	..	..	..	Died.
6	11	White Leghorn	192	350	1·82	
7	13	Do.	139	226	1·62	
8	15	Do.	141	257	1·82	
9	17	....	..	..	..	Died.
10	19	White Leghorn	126	258	2·04	
11	21	Do.	116	257	2·21	
12	23	Do.	157	304	1·93	
13	25	Do.	..	..	..	Died.
14	27	Do.	186	333	1·79	
15	29	Do.	188	343	1·82	
16	31	....	..	..	..	Died.
17	33	White Leghorn	154	317	2·05	
18	35	Do.	..	..	..	Died.
			1,872	3,624	1·93	

APPENDIX V—*contd.*

Pen No.	Hen No.	Breed.	Total number of eggs laid in 9 months.	Total weight of eggs.	Average weight of an egg.	Remarks.
				Ozs.	Ozs.	
1	2	White Wyandotte	137	283	2·06	
4	8	Do.	100	194	1·94	
7	14	Do.	144	274	1·90	
10	20	Do.	89	157	1·76	
13	26	Do.	66	130	1·96	
16	32	Do.	139	276	1·98	
			675	1,314	1·94	
2	4	Rhode Island Red	138	275	1·99	
5	10	Do.	163	315	1·93	
8	16	Do.	124	237	1·91	
11	22	Do.	95	187	1·96	
14	28	Do.	99	175	1·76	
17	34	Do.	144	271	1·88	
			763	1,460	1·91	
3	6	Australorp	122	269	2·20	
6	12	Do.	124	229	1·84	
9	18	....	..	..	..	Died.
12	24	Australorp	134	268	2·00	
15	30	Do.	61	112	1·83	
18	36	Do.	152	284	1·86	
		Total ..	593	1,162	1·95	

E. J. BRUEN,
Livestock Expert to Government,
Bombay Province, Poona.

APPENDIX VI.

Statement showing the stock of birds supplied to the Institutions during the year 1937–38.

Serial No.	Name of Institution.	Number of birds.
	Satara District.	
1	President, Taluka Development Association, Karad	5
2	Village Improvement Scheme under the Livestock Expert to Government, Bombay Province, Poona, at (Taluka Development Association), Koregaon.	12
3	Village Improvement Scheme under the Livestock Expert to Government, Bombay Province, Poona (Agricultural Organiser), at Islampur.	22
4	Village Improvement Scheme under the Livestock Expert to Government, Bombay Province, Poona, at Yellur.	9
5	Village Improvement Scheme under the Livestock Expert to Government, Bombay Province, Poona, at Yellur (Krishnaji Bogir).	1
		49
	Sholapur District.	
6	Village Improvement Scheme under the Livestock Expert to Government, Bombay Province, Poona, Pandharpur.	2
7	Village Improvement Scheme under the Livestock Expert to Government, Bombay Province, Poona, at Javla.	6
		8
	Kolaba District.	
8	Village Improvement Scheme under Livestock Expert to Government Bombay Province, Poona, at Karjat (Rice Specialist).	13
9	Village Improvement Scheme under the Livestock Expert to Government, Bombay Province, Poona, at Pen, Mamlatdar.	7
		20
	Kaira District.	
10	The Collector of Kaira	3
11	The Inspector of Agriculture, Anand	9
12	The President, Taluka Development Association, Kaira	3
		15
	Thana District.	
13	Village Improvement Scheme under the Livestock Expert to Government, Bombay Province, Poona, at Gholwad Taluka.	1
14	President, Taluka Development Association, Palghar	9
15	S. P. Hakimji Government High School, Bordi	7
16	District Agricultural Overseer, Palghar	8
		25
	Ratnagiri District.	
17	President, Taluka Development Association, Ratnagiri	3
	Grand Total ..	120

E. J. BRUEN,
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Bombay Province, Poona.

APPENDIX VII.

Statement showing the stock of birds and setting eggs supplied to the private persons during the year 1937-38.

(From 1st July 1937 to 30th June 1938.)

Serial No.	Districts.	Number of birds supplied.	Number of setting eggs supplied.
1	Poona	100	289
2	Satara	13	14
3	Sholapur	3	15
4	Ahmednagar	2	6
5	East Khandesh	4	..
6	Nasik	2	48
7	Kolaba	13	72
8	Kaira	1	..
9	Broach and Panch Mahal	6	..
10	Ahmedabad	5	..
11	Surat	1	..
12	Thana	21	46
13	Bombay Town and Suburbs	98	15
14	Belgaum	4	15
15	Bijapur	4	..
16	Dharwar	1	9
17	Ratnagiri	..	..
18	States and outside Bombay Province	49	61
	Total ..	327	590

E. J. BRUEN,
Livestock Expert to Government,
Bombay Province, Poona.

APPENDIX VIII.

Statement showing the strength of flock on the Imperial Council of Agricultural Research Poultry Research Scheme, Kirkee Centre on 30th June 1938.

Serial No.	Breed.	Cocks.	Hens.	Cockerels.	Pullets.	Chicks.	Total.
1	White Leghorn ..	..	30	9	10	51	100
2	Rhode Island Red ..	..	18	3	17	40	78
3	Black Minorca ..	1	..	3	38	15	57
4	Light Sussex ..	1	3	5	10	9	28
5	Australorp ..	1	..	..	..	..	1
6	Cross Breed .. White Leghorn. × Rhode Island. Red Cock.	..	..	..	..	78	78
7	Naked Neck ..	..	..	1	7	33	41
8	Chittageng ..	..	..	2	2	7	11
	Total of fowl class ..	3	51	23	84	233	394
		Drakes.	Ducks.			Ducklings	Total.
	Duck Class.						
1	Khaki Cambell ..	6	16	..	..	3	25
2	Indian Runner ..	7	13	..	..	9	29
	Total ..	13	29	..	..	12	54
	Grand Total ..	16	80	23	84	245	448

E. J. BRUEN,
Livestock Expert to Government,
Bombay Province, Poona.

APPENDIX IX.

Statement showing the "Trap nesting" record of different breeds of Poultry.

Serial No.	Name of the Breed.	Number of birds trap-nested	Period of Trap-nesting.		Total period of trap-nesting		Total number of eggs laid.	Average number of eggs laid for the period of record.	Total weight of eggs.	Average size of an egg.
			From	To	Months.	Days.				
										Ozs.
1	Light Sussex ...	3	15th October 1937	to 30th June 1938.	8	15	324	108	636¾	1·96
2	Black Minorca	17	1st October 1937	to 30th June 1938.	9	..	2,253	132·5	4,413	1·95
3	Chittagong ...	2	9th March 1938	to 30th June 1938.	3	22	66	33	86⅝	1·31
4	Necked-Neck ...	7	1st November 1937	to 30th June 1938.	8	..	518	74	663	1·28
5	Khaki-Cambell (Imported).	8	1st April 1937	to 31st March 1938.	12	..	1,110	138·7	2,363¼	2·27
6	Khaki Cambell (Home-bred).	7	1st November 1937	to 30th June 1938.	8	..	682	97·4	1,428	1·09
7	Indian Runner (Imported).	6	1st April 1937	to 31st March 1938.	12	..	507	84·5	1,070½	2·31
8	Indian Runner (Home-bred).	5	1st November 1937	to 30th June 1938.	8	..	327	65·4	730	2·23

E. J. BRUEN,
Livestock Expert to Government,
Bombay Province, Poona.

APPENDIX X.

Statement showing the "Trap nesting" record of different breeds of poultry at Vadala Centre.

Serial No.	Name of the Breed.	Number of birds trap-nested.	Period of trapnesting.		Total period of trap-nesting months.	Total number of eggs laid.	Average number of eggs laid per bird for the period of record.	Total weight of eggs.	Average size of an egg.
			From	To					
								Ozs.	Ozs.
1	White Leghorn	8	1st April 1937.	31st March 1938.	12 months.	1,382	153	2,735·7	1·97
2	Black Minorca	4	Do.	Do.	Do. ..	304	76	609·7	2·00
3	White Leghorn (Pullets).	7	Do.	Do.	11 months.	1,121	160	2,189·8	1·95

E. J. BRUEN,
Livestock Expert to Government,
Bombay Province, Poona.

Programme of Work under the Livestock Expert to Government, Bombay Province, Poona, for the year 1938-39.

I. *Breeding Farms.*—The policy of breeding up reliable pure strain of cattle will continue, keeping in mind the production of more economical animal, which will mature early and calve more regularly. The breeding of a good dual and draught purpose animal on the above lines will continue at Chharodi and Bankapur farm respectively.

II. Nutritional investigations and experiments will be conducted on various food stuffs as far as finances will permit.

III. (*a*) Propaganda in connection with the spreading of the use and benefits of Pedigree bulls will continue together with teaching of better methods of care.

(*b*) The herd Register of all pure cattle of each breed will continue. Thus in a few years we shall have all the pure types of cattle pedigree as we shall know the dams and sires. This also would help us in tracing the progeny of premium bulls. This method would be of great advantage to breeders as they can with the certificate supplied prove their animals to be well bred.

IV. The Co-operation with the Kandivali Gowrakshak Mandali will continue in breeding, raising and spreading Gir Breed in towns, together with the fine illustration of what can be done if the people are so inclined with Panjrapoles to make them useful institutions to the country instead of the burden they are at present.

V. *Poultry.*—(*a*) The work of breeding suitable foreign breeds of poultry will continue on the Government Central Poultry Farm, Kirkee.

(*b*) Investigations regarding incubation, control of diseases and feeding of poultry will continue.

(*c*) To help and advise poultry breeders as far as it is possible.

(*d*) Experiments in the egg laying capacity of different breeds in single testing pens will continue.

VI. *Sheep Improvement Work.*—The Sheep Breeding Farm, Poona, financed by the Imperial Council of Agricultural Research has taken up the work of breeding Merino and Deccani Sheep.

VII. The Scheme for Research in Poultry Husbandry financed by the Imperial Council of Agricultural Research will be continued during the year.

VIII. *Palghar Dairy District Scheme.*—It is hoped that more land would be taken up by farms this year.

IX. *Village Improvement Scheme.*—The following Sections under the above Scheme will be continued :—

(*i*) Village Poultry Improvement on intensive scale,
(*ii*) Poultry Stations Scheme.

APPENDIX M.

Summary of Work done under the Agricultural Engineer to Government, Bombay Province, Poona, for the year 1937-38.

Mr. C. G. Paranjpe was in charge of the Agricultural Engineering Section during the year under report. Out of the three Mechanical Assistants, Mr. R. P. Patel, who was at Poona, under training, has been transferred to Surat and his place has been taken up by Mr. B. B. Vaidya the Mechanical Assistant, Gujarat, from January 1938, on his return from leave for 2 months due to illness.

The year under report was full up with important activities, the principal of which are the Karnatak Agricultural Show at Belgaum, the District Agricultural Shows at Broach, Sanand in Ahmedabad District and Bandhan in Thana District, the repairs to the boring machines, the construction of an additional glass house for Wheat Rust, at the Agricultural College, Poona, for the Plant Pathologist to Government, the demolition of barrack No. 8 at the Agricultural College, Poona, and rebuilding from its material a block of two quarters at Poona and four quarters and a dutch barn at the Niphad Farm, the several constructions including 2 bore-holes at the Sheep Breeding Station, Poona, and similar other works. The Show at Belgaum absorbed a good deal of time and energy as it was run on practically the same lines as those of the Presidency Agricultural Shows at Poona and Ahmedabad.

A big Departmental Court, including various water lifts, two types of boring machines, improved agricultural implements and machines and models, was opened in which majority of the machines were shown to the public in actual working condition and demonstrations of the soil scooper, the Jenkins clod-crusher, the groundnut digger, the improved seed drill and the winnowing fans, were given in the adjoining plot of ground specially reserved for the purpose. In addition to the Departmental Court the Agricultural Engineering Section was entrusted with the control and management of the Machinery Court and the water-supply arrangement for the Show, both for drinking purposes and also for raising the crops since July 1937. Nearly 5,000 feet of pipe line with elevated tanks, towers and taps had to be laid all over the area and the supply maintained at various courts with the help of 2 specially made tube wells and 3 big wells in addition to the military supply main, by suitable power water lifts run day and night during the Show period. The Machinery Court was arranged on extensive lines and nearly 32 business firms had taken part in exhibiting their goods. Other machines such as the chaff-cutters, sugarcane mills, sugar centrifugals, etc., etc., which were demonstrated in other courts had to be also looked after by this section in connection with their installation and running.

The Mechanical Assistant, Surat, was kept in charge of the exhibits at Sanand Show and the Mechanical Assistant, Poona, was sent to

Bandhan to exhibit a small pumping unit and run a cultivators' class for giving tuition in the running and management of oil engines and pumps. A grant of Rs. 5,000 was allotted in January 1938 in connection with the repairs to the boring machines, which were badly spoilt on account of their use during hiring periods. The work had to be rushed on as the time was very limited. However, the total number of machines actually reconditioned amounts to 12. The work at the Sheep Breeding Station had also to be rushed through in order to enable us to complete the important works before the end of the financial year and carry on the rest afterwards.

Advice, Help and Inspection.

The number of enquiries this year amounts to 219 out of which 110 are for pumping, 67 for boring, 3 for windmills, 7 for tractor ploughing, 6 for cane-crushers, 3 for chaff-cutters and 23 for miscellaneous machines. The sites surveyed amount to 37 and the estimates supplied for power plants amount to 39. The erections of new plants including re-erections of a few old, amount to 25 and the repairs executed to the various plants amount to 15. In addition to the periodical inspection of Government machinery at the different farms, 282 private plants belonging to cultivators have been inspected with the help of the three Mechanical Assistants whose aggregate work is given in the following statement :—

Particulars of the work.	Attended by the Mechanical Assistant at			Total.
	Dharwar.	Poona.	Surat.	
Private plants inspected ..	26	173	83	282
Power plants repaired ..	3	2	4	9
New plants erected ..	8	2	8	18
Sites surveyed	12	9	10	31

The number of plants inspected depends upon their location and distance from the nearest railway station and that is why there is no uniformity in the number stated above. As Mr. Vaidya was on leave for two months there was no Mechanical Assistant in Gujarat during this period. The inspection work in this division has therefore greatly suffered. The details of plants erected are given separately later on. The number of drawings and sketches turned out in the year amounts to 85 exclusive of 4 graphs made by the Mechanical Assistant, Gujarat, and 18 cultivator students have been trained in the oil engine class attached to the workshops.

Research on Implements.

The work done in research on implements and on modification of implements is restricted to the following items :—

(1) Improved seed drill.
(2) Winnowing fans.
(3) Cart wheels fitted with ball bearings.
(4) Groundnut digger.
(5) Soil scooper.
(6) Ridgers.

The progress made on each is summarised in brief as under :—

Seed drill.—In all six improved drills were worked during the last sowing season at different centres, such as Sholapur, Bijapur, Gadag, Jalgaon, etc., and about 114 acres were sown with different crops such as jowar, wheat, cotton, etc., with different seed rates. The drill which was kept for trials at the Sholapur Dry Farm has been replaced this year with a new one as it was used for a long time, first at Manjri and then at Sholapur. Similarly three more drills in addition to the above, two specially intended for wheat for Jalgaon tract and one for cotton, were made at the workshops and supplied to the Superintendent, Jalgaon Farm, for his use and demonstration.

The workshop has so far manufactured 24 improved seed drills of different types during the past few years and they have been either distributed or sold as under for experiments and demonstrations :—

The Deputy Director of Agriculture, Southern Division, Dharwar.	2
The Chief Investigator, Dry Farming Research Scheme, Sholapur.	2
The Deputy Director of Agriculture, N. C. D., Nasik..	9
The Superintendent, Cereal Breeding Station, Niphad.	1
The Assistant Agricultural Engineer, Sind ..	1
The Principal, College of Agriculture, Nagpur ..	1
The Agricultural Engineer, U. P., Cawnpore ..	2
The Agricultural Engineer's Workshop, Poona ..	4

Cart wheels fitted with ball bearings.—A few minor improvements have been effected in the arrangement of fixing the ball bearings and other necessary fittings into the wheels in view of the experience gained so far with such type of wheels, which were under our observations. Three more sets of such wheels fitted with ball bearings, one for the Agricultural College Farm, Poona, second for the Ravalgaon Sugar Farm and the third for the Bankapur Cattle Farm, have been supplied during the

year. The idea of fixing ball bearings into these wheels has been much appreciated by the public during the Shows at Belgaon and Sanand in Gujarat, where these wheels were exhibited. The difficulty which hinders the adoption of these wheels into practice is mainly due to the boring of the wheels for fixing the bearings and efforts in that direction are in progress as ordinary lathes cannot admit of such a large sized article for boring.

Winnowing fans.—Further improvements in the design of the C. I. brackets for holding the double chain gearing have been made during this year in view of the experience gained with the old model having two separate C. I. brackets with a view to make the machine more compact, fool-proof and comparatively cheap. Three such models of the latest type have been made at the shops for the Shows at Belgaum and elsewhere for demonstration purposes and have been greatly appreciated by the public. Similarly a design of single geared fan has been built for trials in which a single chain gear with a specially made sproket wheel has been used instead of a belt. In addition to above, one more fan was got made through a local firm and supplied to the Revenue Adhikari, Radhanpur State. The figures of trials supplied by the Superintendent, Surat Farm, and the District Agricultural Overseer, Jalgaon, are very encouraging which can be seen from the following particulars :—

Place.	Type of fan.	Kind of grain.	Quantity of clean grain obtained per hour.	Labour required.
				Men. Boys.
Surat ..	Double chain geared fan of the compact design 3′–6″ in diameter.	Jowar ..	2,629 lbs.	4 2
Khandesh ..	Double chain geared fan of the old model 3′–6″ in diameter.	Wheat ..	1,400 to 1,800 lbs.	....
Do. ..	Double chain geared fan of the old model 3′–6″ in diameter.	Jowar ..	1,100 to 1,400 lbs.	....

In all 14 fans of different types have been so far prepared at the workshops in addition to 4 got made locally during the past few years and they have been distributed as under for trials and demonstrations :—

Southern Division	2
Khandesh	9
Agricultural Engineer's Workshop, Poona ..	6
Native States	1

Groundnut digger.—Out of the three diggers so far manufactured at the workshops, two were demonstrated last year at Gokak and Gadag respectively and the third was demonstrated at Belgaum during the show period. The improvements which were effected during the last year in view of the experience of the previous year's trials have been found useful. However it seems that the stiff soils in certain cases demand still stronger supports for the blade and improvements in that direction so also in other points are being taken in hand as soon as time permits.

Soil scooper.—The scooper at the Bijapur Dry Farm was again tried this year. Improvements which could be done on the site with local help were effected to remedy the defects which were found when dealing with the peculiar type of soil in the tract. It was however found that the soil conditions there require some further improvements to make the scooper work more satisfactorily and as it was not possible to effect them on the site, the scooper has been brought to Poona for doing the needful.

The scooper at Sholapur Dry Farm was fitted with new all-steel wheels in place of the wooden ones used in old models and further improvements made to conform to the latest design.

Ridgers.—The wooden and steel ridgers referred to in the last year's report were sent to Surat for trials in comparison with a local harrow fitted with a cross plank for forming ridges. It was noticed during these trials that these ridgers used to wobble a good deal and could not be kept steady while working, presumably due to their pointed edges. The ridges of required size could be formed with these implements in one trip only, while the harrow needs two trips for the same, but the draft required for the ridgers is found to be excessive.

Further trials in identical soil conditions are necessary to form some definite opinion and arrangements are being made to test them again next year.

Installation of machinery for private individuals, departmental institutions and public bodies, etc.

The following is a brief summary of the work done by this section in connection with the installation of power plants for private individuals, departmental institutions and public bodies including those connected with the Village Improvement Schemes.

Southern Division.

1. Pumping plant consisting of a 5 BHP Kirlosker engine and 2" Delta centrifugal pump at the Laper Asylum, Bijapur.
2. Pumping plant consisting of a 3 BHP Tobata engine and 2" centrifugal pump for Mr. Halapanavar of Kalghatgi.

3. Re-erection of the pumping plant on the small well at the Belgaum show ground.
4. Pumping plant consisting of 8 BHP Blackstone crude oil engine and 3″ Delta centrifugal pump at Torvi for Mr. B. S. Akki.
5. Re-erection of the 2½″ electrically driven pump on the show well at Belgaum.
6. Pumping plant consisting of a 7 BHP Bates crude oil engine and a 4″ Kirlosker centrifugal pump at Wakkund (Bailhongal) for Mr. Sidramaya Swami.
7. Pumping plant consisting an 8 BHP Kirlosker crude oil engine and 3″ Kirlosker centrifugal pump at Nawalur for Mr. Jog, pleader at Dharwar.
8. Pumpirg plant comprising an 8 BHP Blackstone crude oil engine and 3″ Pulsometer centrifugal pump for Mr. H. B. Kulkarni at Bardoor, Mundergi Peta.

Central Division.

9. Pumping plant consisting of a 6 BHP Petter crude oil engine and 2½″ Pulsometer centrifugal pump for Mr. Shanker S. Chirmade at Asoda, taluka Jalgaon.
10. Pumping plant consisting of a 10 BHP Crossley crude oil engine and 2½″ Ruston centrifugal pump for Mr. Narayan Ramu Patil at Chahardi, taluka Chopada.
11. Ginning plant consisting of a Platt's 40″ single roller single action cotton gin fitted with ball and roller bearings and an 8 BHP Blackstone crude oil engine at Bhadgaon Government Farm.
12. Pumping plant consisting of an 8 BHP Blackstone crude oil engine and 3″ Ruston centrifugal pump on river Ulhas at Eranzade, near Badlapur, taluka Kalyan, for the village improvement scheme.
13. Bullock power persian wheel of Kirlosker make on river Kundalika at Roha for the village improvement work.
14. Combined pumping and grinding plant for Mr. Gangadhar Tatya Wede of Dondewadi near Khatav, consisting of a 13 BHP Ruston crude oil engine, a 3″ Ruston centrifugal pump and 2 horizontal grinding machines complete with counter-shaft.
15. Combined shearing and pumping plant for the Sheep Breeding Scheme at Poona consisting of a 6 BHP portable Petter crude oil engine, model 21 Stewart shearing plant with four shearing units, a countershaft, a grinder etc. and a Myers 9″ × 3½″ Bore-hole power pump with elevated tank and connections.

16. Pumping plant consisting of an 8 BHP Blackstone crude oil engine and 3″ Ruston centrifugal pump at Tehere near Malegaon for Mr. L. D. Patil.
17. Hand pumps on wells at the Mhasavad and Jamner Agricultural bias classes.

Gujrat.

18. Power cane crusher, Sharat, for Mr. Manibhai H. Desai of Atgaon, taluka Chikhali, district Surat.
19. Power cane crusher, Sharat, for Mr. J. P. Manekshana of Dulsad, taluka Bulsar, district Surat.
20. Pumping plant consisting of a 6 BHP Petter crude oil engine and 2″ Gwynnes pump for Mr. Ranchhodji H. Desai of Gandeva, taluka Chikhali, district Surat.
21. Pumping plant consisting of a 5 BHP Petter crude oil engine and 2″ Gould centrifugal pump for Mr. Ghelabhai Ranchhodji Desai of Pipalgabhan, taluka Chikhali, district Surat.
22. 2″ centrifugal pump for Mr. Jogibhai U. Patel of Pipalgabhan, taluka Chikhali, district Surat.
23. Re-erection of a pumping plant consisting of a 6 BHP Clayton crude oil engine and 2″ centrifugal pump at Umersadi, taluka Pardi, district Surat, for Mr. Paragbhai Desai.
24. Re-erection of a 4″ Ruston centrifugal pump for Khan Bahadur Bhiladwala at Pardi.
25. Re-erection of a pumping plant belonging to Mr. Ganu Avdaji Dongre of Arvi, taluka Junnar, district Poona, consisting of a 7 BHP Sunrise engine and 3″ Royal centrifugal pump.

Repairs to private plants.

The plants repaired for private individuals and local bodies during the year under report can be summarised as under :—

1. Machinery at the Gilligan Cattle Farm at Pimple, district East Khandesh.
2. Pumping plant belonging to Mr. R. B. Mohite of Rajewadi, district Satara.
3. Combined pumping and grinding plant belonging to Mr. Gangadhar Tatya Wede at Dondewadi, taluka Khatau, district Satara.
4. Pumping plant at Arvi, taluka Junnar, district Poona, belonging to Mr. G. A. Dongre.
5. Engine of Mr. Shigali at Hulikatti, taluka Parasgad, district Belgaum.

6. Pumping plant at Eranzade on river Ulhas in Thana District, installed from the Village Improvement funds.
7. Engine of Mr. Pragjibhai G. Desai of Pipalgabhan, taluka Chikhali, district Surat.
8. Engine belonging to Mr. M. H. Desai of Atgaon, taluka Chikhali, district Surat.
9. Pumping plant belonging to the Dairy at Sanjan, district Thana.
10. Pumping plant belonging to Mr. M. D. Desai of Pardi, district Surat.

Special Works.

In addition to the Show work at Belgaum, this section was entrusted with the following works of special nature which took considerable time and attention until they were executed :—

(*a*) Constructions at the Sheep Breeding Station including two blocks of quarters each consisting of 5 rooms with a verandah in the front, 8 paddocks of chain link fencing with doors, etc., two tube wells, one fitted with a hand pump and the other fitted with a power pump, a steel shearing shed with 4 shearing units, an engine house, an elevated tank and tower with water connections, reinforced concrete Hume water troughs, etc., etc. all financed from the funds of the Imperial Council of Agricultural Research, Delhi.

(*b*) A 35′ × 10′ × 10′ glass house for the Plant Pathologist to Government for experiments on wheat rust at the College of Agriculture, Poona, with steel frame work, continuous roof ventilators operated by suitable gearing, R.C.C. working table with sink, top hung swinging windows below eaves, etc., etc. all financed by the Indian Central Cotton Committee.

(*c*) Demolition of barrack No. 8 and rebuilding from its material a block of two quarters at the College of Agriculture, Poona, and a block of 4 quarters and 3 latrines at the Cereal Breeding Station, Niphad.

(*d*) Construction of a Dutch barn and laying of drainage pipes with sinks, etc. at the Cereal Breeding Station, Niphad.

(*e*) Repairs to 6 Musto power boring machines and 6 Calyx rotary drills.

Miscellaneous works done at the workshops and in the district, both for the Engineering Section and other departmental institutions.

(1) Fencing the cotton plot and repairs to the bore hole pump at the Bijapur Dry Farm.

(2) Fencing the plot at Shera near Ankleshwar for the Plant Pathologist to Government, Poona.

(3) Preparation of exhibits and their despatch for the Karnatak Agricultural Show at Belgaum and for the Sanand and Broach shows.

(4) Repairs to the following machines :—

(*a*) Spray pump for the Poultry Farm, Kirkee.

(*b*) Chaff-cutter at the Ganeshkhind Fruit Experiment Station.

(*c*) Pressure gauge of the Assistant Professor of Mycology, College of Agriculture, Poona.

(*d*) Power dusting machine from the Ratnagiri Farm.

(*e*) Engine at the Bankapur Cattle Breeding Farm.

(*f*) Bullock gear from the Agricultural College Farm, Poona.

(*g*) Bullock gear and the ball bearing cart from the Agricultural College Dairy, Kirkee.

(*h*) Autoclave from the Plant Pathologist to Government, Poona.

(*i*) Dusting machine from Phaltan State.

(*j*) Power crusher at Arbhavi Farm.

(*k*) Chaff-cutter and pumping plant at Dharwar Farm.

(*l*) Engine at Surat Farm.

(5) Manufacture and supply of the following :—

(*a*) Brake arrangement for the ball bearing cart at Bhadgaon Farm.

(*b*) Handle for the gas engine at Padegaon.

(*c*) Soil container to the Agricultural Chemist to Government.

Loan of boring and pumping plants and other machinery.

The following is the list of machinery, pumps and other equipments supplied on loan :—

(1) Diaphragm and fire portable pumps to Messrs. Ranade Bros., Poona.

(2) Fire portable pump to Mr. Bibve of Poona.

(3) Hydraulic test pump to Mr. K. N. Honwad of Poona.

(4) Girder frame to Mr. Pingle of Poona.

(5) Diaphragm force pump to Mr. G. C. Govande.

(6) Diaphragm force pump to Mr. Byramjee Rustomjee, of Poona.

(7) Myers bore hole power pump to Belgaum Show.

(8) Meyers bore hole power pump to Sheep Breeding Scheme, Poona.

(9) Myers bore hole power pump to the Garrison Engineer, Belgaum.

(10) Petrol engine pump to Soundatti Municipality.

(11) Petrol engine pump to Kumta Farm.

(12) Semi-rotary pump to Mr. V. Y. Chitale of Poona.

(13) Myers hand pump to Mr. G. C. Govande of Poona.

(14) Myers hand pump to Principal V. G. Gokhale, Poona.

(15) Myers hand pump to Sheep Breeding Scheme, Poona.

(16) Cane crusher to Mr. N. B. Ghule of Manjri.

(17) Road Roller to Mr. Fali Merchant of Poona.

(18) Road roller to Mr. S. S. Kand of Poona.

(19) Pumping plant to the Rural Reconstruction Association, Ahire.

(20) Loan of Case tractor with services of driver to the Deputy Director of Agriculture, North Central Division, Nasik for anti-erosion scheme.

(21) Calyx drill to the Garrison Engineer at Belgaum.

(22) Calyx drill to Mr. G. C. Govande of Poona.

(23) Calyx drill to the Karnatak Agricultural Show, Belgaum.

(24) Calyx drill to Mr. N. S. Hodlur of Guledagudda.

(25) Calyx drill to Mr. N. M. Vartak of Bombay.

(26) Calyx drill to Messrs. Manahar Bros. of Bombay.

(27) Musto power boring machine to Mr. G. C. Govande of Poona (thrice in a year).

(28) Musto power boring machine to Sheep Breeding Scheme.

(29) Musto power boring machine to Karnatak Agricultural Show, Belgaum.

(30) Hand boring machine to Mr. G. C. Govande, Poona.

(31) Hand boring machine to the Poona City Municipality.

(32) Hand boring machine to the Devihosur Agricultural School for cleaning the bore.

General.

It has been decided to close the operations at Palej with the defibrating machine and dispose it of or store it elsewhere. Efforts to sell it have not yet met with any success. A firm in Ceylon wished to consider over its purchase if the machine successfully dealt with the Ceylon cotton seed. The seed was tried in the machine during the last season and a sample sent to the firm for approval. The decision of the firm is yet awaited.

In spite of the excessive pressure of work during the whole year round, it was possible to keep pace with the various activities with the strenuous efforts of the staff only who did their best to face the position.

The receipts during the year on the sale of boring machines, spare parts and on the hire of pumping plants, boring machines and other goods amount to Rs. 16,724-3-4 as detailed below from July 1937 to end of June 1938.

	Rs.	a.	p.
Sale of boring machines	8,865	10	2
Sale of boring spares	118	11	6
Sale of general spares	533	15	5
Sale of miscellaneous articles	122	14	0
Hire of boring machines	6,030	5	4
Hire of pumping plants	157	13	10
Hire of boring tools	421	9	7
Hire on miscellaneous goods	473	3	6
	16,724	3	4

The above receipts do not include the cost of material supplied and repairs undertaken for departmental institutions, which approximately amount to Rs. 207.

C. G. PARANJPE,
Agricultural Engineer to Government,
Bombay Province, Poona.

Programme of work under the Agricultural Engineer to Government, Bombay Province, Poona, for the year 1938–39.

1	Research on implements including their modification and tests.	(*a*) Modifications and tests with wheat and cotton seed drills, winnowing fan, groundnut digger, soil scooper, ball bearing cart wheels, etc., etc.
		(*b*) Further tests with a ridging implement.
2	Famine Pumping ..	(*a*) Inspection of pumping sites on big rivers in the Province for growing fodder.
		(*b*) Keeping the 7 famine pumping sets in readiness.
3	Advice and help ..	(*a*) Training of cultivator students in driving of engines and pumps.
		(*b*) Periodical inspection of agricultural machinery.
		(*c*) Advice to cultivators in agricultural machinery and periodical inspection of their power plants.
		(*d*) Advice to Divisional Officers in machinery matters.
		(*e*) Survey of sites and supply of drawings and estimates.
		(*f*) Erections and repairs of machinery for private individuals through the Mechanical Assistants.
4	Higher Technical Assistance ..	(*a*) Help to the Divisional and other Departmental Officers in case of repairs and breakdowns.
		(*b*) Erection of water lifts on the Patalganga, Kundalika and Ulhas rivers in connection with the village improvement scheme.
		(*c*) Erections of Departmental machines.

5. Special works	..	(*a*) Construction of an Insect-proof Glass House with Insectary and a Potting shed at the Agricultural College, Poona.
		(*b*) Construction of students' quarters at the Government Fruit Experiment Station, Kirkee, and the Government Central Poultry Farm, Kirkee.
		(*c*) Removal and storage of the defibrating machinery at Palej.
6. Running of plants	..	(*a*) Running of the workshops and demonstrations of water lifts on the Experimental well.
7. Sale and hire of machines	..	(*a*) Sale of boring machines, their spares and tools.
		(*b*) Hire of boring machines.
		(*c*) Hire of pumping plants.
		(*d*) Sale of other stores, tools and plants.
		(*e*) Working of the tractor for the soil erosion work in North Central Division.
8. General	..	(*a*) Routine work pertaining to office, workshops and divisions.
		(*b*) Charge and maintenance of the following :—
		The Nangaon Pumping Plant.
		The boring machines at 3 depots.
		The power baling and bruising plant at Karajgi.
		The steam plough.

C. G. PARANJPE,
Agricultural Engineer to Government,
Bombay Province, Poona.

APPENDIX N.

Summary of Work done under the Horticulturist to Government, Bombay Province, Poona, for the year 1937–38.

The year under report is an eventful one because efforts were successfully made during this period to get into a close touch with individual fruit growers in the Province by compiling a list of all of them with a view to understand their difficulties and to help them as best as possible. The other and the most outstanding event, however, was that the Honourable Minister for Agriculture took up the idea of providing for the training of 100 men in Horticulture at the Ganeshkhind Fruit Experiment Station, Kirkee, and provided funds for the erection of a hostel and the award of scholarships to some of the students.

I. Administration.

Mr. S. R. Gandhi, M.Ag., Superintendent, Ganeshkhind Fruit Experiment Station, Kirkee, went on deputation to Ceylon Government from 17th October 1937, his place having been taken by Mr. B. Nazareth, B.Ag. Mr. R. S. Dubhashi, B.Ag., was appointed Superintendent, Modibag, from the same date. Mr. P. G. Dani, B.Ag., B.Sc., reverted from U. P. service to this section on 1st October 1937, and then went on leave for four months, Mr. R. D. Gaitonde, B.Ag., having been temporarily appointed in his leave vacancy.

As required by G. C. Memo. No. 8490/33, R. D., dated the 7th June 1938, it is reported that there was no case of the nature mentioned in the G. R. in this section.

II. Education.

Of the 56 students who appeared for the degree of B.Sc. (Agri.) all passed in Horticulture. There were 30 students for the Mali-in Training course at the Ganeshkhind Fruit Experiment Station, Kirkee, three special students for Horticulture at the Modibag and two students for special course in fruit preservation.

III. Research.

1. *Laboratory.*—Research in fruit preservation is considerably handicapped for want of adequatel aboratory facilities. Investigations in the drying of kerwanda and preservation of juice were continued. Fruits were dried after subjecting them to preliminary treatments like blanching and fumigation with sulphur dioxide. The average drying period is 15 days. The question of clarification of kerwanda juice by natural sedimentation at room temperature is being investigated.

2. *Cold Storage.*—Nagpur oranges of the "khatta bahar" kept in good condition at 40°F. for about 10 weeks but showed a somewhat higher rate of wastage than the fruit of "mitha bahar". In the case of Malta oranges, the big sized fruit kept a much fresher appearance than the small sized fruit.

Pre-cooling of Alphonso mangoes at a lower temperature than the storage temperature of 45° to 48°F. was found impossible as exposure even for a short time at 30°F. chilled the fruit and affected its ripening.

Only the fully mature potatoes were found suitable for cold storage. There was an accumulation of sugars in the tubers held at 35°F. The tubers remained without sprouting for 7 months at 40°F. and were good for table use.

The fruit of the Basrai variety of banana was chilled at 56°F. but ripened satisfactorily at 60° and 68°F. and developed a good yellow colour. The Delicious variety of apple from the Chaubattia Hills was found to be a good keeper in cold storage and remained in a very good condition for over 8 months at 32° and 35°F. Raw chiku fruit ripened normally at 52°F. but was chilled at the lower temperatures. Ripe fruit could be kept in good condition for about 6 weeks at 32°F. and 35°F. when wrapped in waxed paper.

Strawberries from Mahabaleshwar could be kept in good condition for 3 weeks at 32° and 35°F. Litchi from Bihar kept well for 3 months at 30° and 35°F., but the red colour of the shell turned brown. Ripe pineapples remained in a satisfactory condition for one month at 30° to 52°F., but the green fruit was chilled at a temperature lower than 45°F.

Cabbage stored well at 32°F. for about 6 months. Cauliflower kept well for 3 months when wrapped in waxed paper. Frenchbeans kept well for 3 weeks and peas for 4 weeks at 32° to 35°F. Carrots could be stored at 32° to 35°F. for about 3 months. Onions remained without sprouting for 7 months at 32°F.

3. *Vegetable Selection.*

Chillies.—Among the Deccan types, strain numbers C-2, C-9 and 13–21 gave 58, 11 and 11 per cent. superiority over the local respectively but the results are not statistically significant due to soil variations. Khadikai strain No. 48–44 gave 8 per cent. increase over the local. Udikai and Dabkai types did not give any increase over the locals.

Brinjals.—Among the Gote types, strain Nos. 28–21 and 32–7 showed 14 and 7 per cent. superiority over the local respectively Dorli strain Nos. 8–3–24, 8 C-2–24, 23–3–24 and 27–32–6 gave 33, 16, 5 and 19 per cent. superiority over the locals respectively. In either case, however, the results of strain Nos. 28–21 and 8–3–24 are statistically significant.

IV. Work at the Ganeshkhind Fruit Experiment Station, Kirkee.

(*A*) *Banana variety trials.*—The Basrai has once again shown that bunch for bunch it is superior to Walha, the superiority obtained being 24 per cent. against 28 per cent. of the previous year. In money value one bunch of Basrai gives on an average 10 to 12 annas more than Walha.

A comparative yield of the two varieties was studied for a period of three years. The actual income works out to Rs. 1–11–0 for Walha and Rs. 2–10–0 for Basrai. Thus the superiority of Basrai over Walha is now definitely established.

(*B*) *Banana Manurial Trials.*—Application of Farm Yard Manure in combination with sulphate of ammonia plus potash and castor cake plus potash gave a superiority of 15·6 per cent. and 14 per cent. respectively over the control.

A new experiment is laid out with Farm Yard Manure only with Nitrogen dose ranging from 0·2 to 0·8.

(*C*) *Mango Manurial Trials.*—Selected 108 stock plants were grafted and of these 50 plants of uniform vigour and height have been planted 35 feet apart in a randomised manner. The basic dose of manure has been given.

(*D*) *Mosambi Manurial Trials.*—The mosambi trees bore fruit for the first year. The bone-meal combination with Farm Yard Manure has given better results to the extent of 25 per cent. The average weight of fruits, however, is found to be inversely proportional to the total number of fruits in any treatment.

(*E*) *Improvement of Guava by Selection.*—Lucknow No. 49 still remains to be the best selection both in respect of quality and quantity.

(*F*) *Improvement of Pomegranate by Selection.*—The Ambe-bahar and Mrig-bahar crops are being studied for characters.

(*G*) *Furrow vs. Basin method of Irrigation—Mosambi.*—The wetted area in the bed system of each plant is 100 square feet and in the furrow method 207 square feet. The quantity of water consumed by furrows is nearly 32 per cent. more than that by the beds.

Grapes.—The basin method consumed up to 64 gallons of water per vine and the furrow method 88 gallons in the 13 irrigations given during the cropping season. The per plant yield worked out at 14·65 lbs. for the vines treated by furrow method and 13·95 lbs. for those treated by basin method.

Further experiments in connection with the methods of plant propagation and nursery improvement could not be taken up as the manurial and varietal experiments absorbed all our attention. Arrangements to take up this work whenever favourable opportunity comes have already been made.

The total receipts of the garden amounted to nearly Rs. 14,000, expenditure under contingencies being Rs. 11,372.

V. Work at the Modibag.

The garden is a place for the teaching of students of the College of Agriculture, but more than that it is a place where the students and the nurserymen at large can learn how to make Horticulture a paying concern. The garden makes large sales of nursery plants, prominently the grafts of Alphonso, Pairi, Lucknow No. 49 and Chiku and the budded plants of Santra, Mosambi, grape fruit, Italian lemon, Navel orange, Pummelo, Kagadi limbu and roses. The total receipts of the garden amounted to Rs. 5,400 though the expenditure under contingencies suffered a further reduction of Rs. 150 the total contingencies of the year being Rs. 4,240. No regular experiments are conducted in this garden for want of grants but some observations of experimental nature are being recorded.

VI. Agricultural Service and Propaganda.

1. *Fruit and Vegetable markets.*—The life of the Provincial Fruit and Vegetable Market Committee was extended to a further period of three years. The Committee met twice during the year and transacted a good deal of useful work. A large number of grievances received from the fruit growers were properly considered and redressed wherever possible.

2. *Export of mangoes to England.*—The results of last year's export of mangoes encouraged Messrs. Bodke & Sons to send two consignments of Alphonso mangoes this year also in order to keep interest in the London market. Fruit was also sent to Cairo by Air service.

3. *Issue of Horticultural Circulars.*—A list of all fruit growers in the Province was prepared. Three circulars of Horticultural interest and importance were issued and distributed to all the fruit growers through the Divisional Deputy Directors of Agriculture.

4. *Advisory work.*—Technical advice was rendered by personal visits and inspection of gardens in many districts in the Province. Budding and grafting was done for the people at a number of places and grafts and plants were sold very widely. Horticultural instruction was imparted at four places and two big classes lasting for 15 days each were held on the Gokak and Kumta farms. Horticultural Stalls were arranged at the Karnatak Agricultural Show Belgaum in January 1938 and the Khadi and Village Industries Exhibition at Haripura in February 1938, at both of which places a party of students was taken to demonstrate jam and jelly making and the preparation of lime juice and to show that Horticultural students can " earn while they learn ". Another stall was arranged at the Fourth Indian Industrial Fair in Bombay which ran from 19th March to 20th April 1938. Preparation of lime juice was demonstrated to Sheth Manekchand Kisandas at Uttran. A meeting of Nurserymen was convened at Dhamdhare Talegaon where the question of registration of their nurseries was discussed. 1,185 querries were replied by correspondence. The acreage under fruits is now definitely on the increase.

VII. Publications.

1. Cheema G. S. and Dubhashi R. S.—

"Development of the Kagdi lime Industry in Western India," Bull. No. 180 of 1938. (In press.)

2. Dubhashi R. S.—

"Revision of Bull. No. 95 of 1919. (Cultivation of Oranges and allied fruits in Bombay Province." (In press.)

3. Karmarkar D. V.—

"The Refrigerated Gas storage of Fruits and Vegetables" Agri. and Livestock in India, Vol. VII, part VI.

4. Sayed I. A.—

"A note of the economic value of Pine-apple cultivation as practised in North Kanara." Agri. College Magazine, Poona, Vol. 29, No. 2.

5. Sayed I. A.—

"Jam making" Agri. College Magazine, Poona, Vol. 29, No. 4.

Besides the above, Dr. Cheema gave a Radio talk from the Broadcasting Station, Bombay on "The People's Food" on 17th February 1938.

The following leaflet was issued departmentally.

1. Leaflet No. 3 of 1938. Export of Mangoes to England in 1937.

Programme of Work for the year 1938–39.

1. Varietal trials of bananas to be continued.
2. Manurial trials on mangoes, mosambis and bananas to be continued.
3. Selection of Pomegranate to be continued.
4. Study of the method of orchard irrigation to be continued.
5. Cold storage and Gas storage research.
6. Vegetable Research.
7. Nursery improvement.
8. Provincial Fruit and Vegetable Market Committee's work to be continued.
9. Issue of Horticultural Circulars.
10. Holding of special horticultural classes in the district.

G. S. CHEEMA,
Horticulturist to Government,
Bombay Province, Poona.

COLLEGE OF AGRICULTURE :
Poona, 15th July 1938.

Abstracts of Publications.

1. "*Development of the Kagdi lime industry in Western India.*"

The Bulletin gives upto-date information on the cultivation of kagdi limes with comparative notes of methods practised in foreign countries and also deals with the preparation of preserved products.

2. "*Cultivation of oranges and allied fruits in Bombay Presidency.*"

The Bulletin as was written in 1919 has now been fully revised bringing it upto-date. The nomenclature of citrus fruits, for example, has been corrected and the chapter on 'suggestions' has been rewritten.

3. "*The Refrigerated Gas storage of fruits and vegetables.*"

The author has reviewed the origin and the progressive development of this new method of storage which is now used for storing apples on a commercial scale in England.

4. "*Note on the Economic value of Pine-apple cultivation as practised in North Kanara.*"

The two commercial varieties namely Kew and Queen have long been under cultivation. The author has attempted a study of their economic value and has explained the possibilities and extent to which economy in cultural operations can be effected.

5. "*Jam making.*"

The author has suggested that the manufacture of jams and jellies may be undertaken as a profitable cottage industry. The process of jam making is explained in detail.

APPENDIX O.

Summary of Work done under the Inspector of Agricultural Schools, Bombay Province, Poona, during the year 1937-38.

Charge.—The post of the Inspector of Agricultural Schools, Bombay Province, Poona, had for a major portion of the year been kept vacant during the leave period of the permanent incumbent Mr. R. Y. Hulkoti, who was on duty from 16th October 1937 to the end of the year under report with one months' leave in February 1938. The work of inspection had been entrusted to the District Staff of the Agricultural Department through their Divisional Deputy Directors of Agriculture. The office work was carried on by the Clerk Mr. D. K. Shirsat.

Nature of Work.—The nature of work continued to be the same as mentioned in the previous report. The special work entrusted during the year under report was in connection with the two Agricultural Shows one at Sanand in the Ahmedabad District and the other at Belgaum in Karnatak. At both the above places, the Inspector had to make the best of what he could as he had very short time at his disposal. The Rural School Court at the Belgaum Show had been made instructive and interesting with the hearty co-operation of the local Educational and Board Officers and Devihosur Agricultural School and an Agricultural Bias Class and Devihosur boys had been kept at work to give an idea to the cultivators as to what is being done at these institutions.

Working of the Vernacular Agricultural Schools.—All the three Vernacular Agricultural Schools at Devihosur, Dhulia and Rajapur continued to do very good work and have been very popular. All these three Schools were examined by me at the end of the year and the results show good work and progress. The number of students in the different classes at the different schools was as shown below :—

Name of School.	I Year.			II Year.		
	Admitted.	Appeared for Examination.	Passed.	Total number on Roll.	Appeared for Examination.	Passed.
1. Devihosur ..	13	13	10	19	19	17
2. Dhulia ..	14	14	14	16	16	16
3. Rajapur ..	18	14	14	8	8	7
Total ..	45	41	38	43	43	40

The expenditure and receipts are shown in the following statement :—

Name of School.	Area of land in Acres.	Number of boys at School.	Total Expenditure.	Farm Expenditure.	Farm Receipts.	Remarks.
			Rs.	Rs.	Rs.	
1. Devihosur ..	25	32	7,714	1,389	1,154	
2. Dhulia ..	24	30	8,149	2,418	1,709	
3. Rajapur ..	10	22	6,377	1,489	1,235	

Past students have been doing very good work as Kamgars in the Department and under the Taluka Development Associations and as School Teachers at the Agricultural Bias Classes and ordinary schools. An Association of these Past Students has been formed in the case of the Devihosur School and the Head Master and the other staff of the Department have been helping them in solving their difficulties to a limited extent.

Working of the Agricultural Bias Classes.—The number of the Agricultural Bias Classes remained the same as in the previous year, though a few classes changed localities. As a result of the Special Classes held last year for the Agricultural Teachers and the Officers connected with the inspection of the Agricultural Bias Classes, there has been a marked change in the attitude of both the Agricultural Teachers and Officers concerned. There has consequently been a marked general tendency to budget as carefully as possible and grow better crops and more paying ones too than in the past. There have been many complaints that the District staff of the Agricultural Department that inspect the Agricultural Bias Classes do not seem to realise that these classes are not vocational classes and they seem to lay more stress on the practical side of the work and less stress on the educational side of it.

The result of the Vernacular Final (Agriculture) Examination show that good progress has been made to remove the prejudice of the cultivators that teaching given in the Agricultural Bias Classes is not

efficient. The following table gives an idea about the results of Vernacular Final (Agriculture) in the different Divisions :—

Name of Division.	Number of Schools.	Total number of boys appeared during the last 5 years.	Total number of boys passed during the last 5 years.
1. Central Division	31	1,529	846
2. Northern Division	12	637	327
3. Southern Division	29	876	410
4. Bombay Division	12	479	289
Total ..	84	3,521	1,872

Rural Clubs.—The Rural Clubs have been started in many of the Agricultural Bias Classes but they need proper and frequent guidance from the local officers.

Syllabus.—Revision of the Syllabus so as to make it a general one to all the Rural Primary Schools is quite necessary. Government is thinking of effecting a radical change in the spirit and tone of the rural education.

General.—Partly owing to pecuniary stringency and partly to apathy of the people themselves, there has not been marked development in both the Vocational and Prevocational Institutions. Their number is practically standing still and in fact the schools of the Vocational type have been reduced in number though the boys passed out of such institutions have been doing very good work as Managers of private estates and Kamgars in the Agricultural Department and in the Taluka Development Associations and as Teachers in both ordinary and Agricultural Bias Classes. I think it is to the interest of the vast rural population that both the types of institutions should be increased in number as early as possible.

R. Y. HULKOTI,
Inspector of Agricultural Schools,
Province of Bombay, Poona.

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APPENDIX P.

Summary of the Work done under the Professor of Agricultural Economics and Provincial Marketing Officer, Bombay Province, Agricultural College, Poona, for the year 1937-38.

Dr. M. B. Ghatge continued to work as Professor of Agricultural Economics and Provincial Marketing Officer, Bombay Province, Poona. Messrs. N. V. Bhagwat, B. H. Patil and B. P. Deshpande also continued to work as Assistant Marketing Officers. Mr. M. M. Desai worked as Assistant Marketing Officer till 31st August 1937. Mr. A. K. B. Cazi, B.Ag., B.Sc. (Edin.), N.D.D., D.I.C. (Lond.), was appointed as Assistant Marketing Officer in place of Mr. M. M. Desai who was transferred as Assistant to Livestock Expert. Messrs. K. M. Shah and K. S. Patel worked as Demonstrator and Investigator in Agricultural Economics respectively.

Education.

Students of the B.Sc. (Agri.) were taught Agricultural Economics. The number that appeared for the University Examination including last year's failures was 56 out of which only 5 failed.

The important feature of the year was the civilians' class. One forenoon the civilians who attended the course and who numbered five were given an idea of the weaknesses in anna valuation and its effects on statistical basis of the province. The economic conditions of the farmers in the province were also discussed.

Syllabuses for M.Sc. (Agri.) examination by paper and by paper and thesis combined were prepared and submitted to the University of Bombay. Short courses in Farm Management and Rural Social Organisation also were prepared.

Mr. K. M. Shah submitted a thesis to the Bombay University for Ph.D. examination utilising the first two years' data of the research work in Charotar. It is now learnt that he is awarded the degree.

Research (A).

The study into the economics of farming business by cost accounting method in the Charotar tract of Gujarat continued in its fifth and

final year. The same 31 farmers consisting of 20 *patidars* and 11 non-*patidars* as in the previous year were continued under observation.

Season.—Rains set in in the last week of June almost a week later than in the previous year. Farmers started sowing the very next day though a few of them took a chance to sow before rains. The first fortnight of July received intermittant showers. The trouble from *Kattra* caterpillars was a special feature of this fortnight. They damaged growing crops both in fields and in seed-beds like *bajri, tur, til, wal* and tobacco seedlings. Tobacco seed was required to be broadcast often. This was followed by continuous rains throughout next fortnight; farmers could do no field work. It cleared up in the first fortnight of August; farmers finished their interculturing operations. But the second fortnight also went without rains. It caused anxiety to farmers, because, in addition, the growth of crops, especially of paddy, *kodra* and *vagardu*, being affected, the transplanting of tobacco, could not be started. It again started raining in the beginning of second week of September. General transplanting of tobacco was then completed; rains continued throughout that week. The continuity benefitted the tobacco crop in particular and also other crops except *bajri* which was then ready for harvest. October went entirely cloudless and therefore the scorching heat gave a set back to tobacco crop. The unusual rain in the second week of December however improved the growth of tobacco but the occurrence of frost early last week of December damaged it considerably. Frost damaged *tur*, cotton and castor also. Thus the season during the year was characterised by long breaks, torrential rains and their uneven distribution and occurrence of frost. All these together affected the out-turn of crops as seen in table No. 1.

Area and cropping.—The total area cultivated by the above-mentioned 31 farmers amounted to Acres 218, gunthas 27 giving an average holding of Acres 7, gunthas 2·2 per farmer. Out of the total cultivated area 56·4 per cent. was fully owned, 36·6 per cent. land taken on lease and mortgage and 7·0 per cent. land cultivated in partnership. The proportion of land owned to land taken on lease worked to 71·6 and 28·4 in the case of *patidars* whereas it worked to 41·2 and 58·8 in the case of non-*patidars*. Thus out of the average holding of Acres 7, gunthas 2·2 only Acres 3, gunthas 39·2 belonged to the farmer, Acres 2, gunthas 34·4 were taken either on lease or mortgage and gunthas 19·6 were worked in partnership. Again out of he total cultivated area 91 per cent. was under cultivation and the

remaining 9 per cent. under *shedha* and grass land. The cropping during the year was as under :—

Table No. 1.

Crops.	1936-37.		1937-38.	
	Area.	Per cent.	Area.	Per cent.
	A. g.		A. g.	
1. Tobacco	84 35	33·7	85 13	36·0
2. Tobacco (Calcutty)	6 20	2·5	..	..
3. *Bajri* dry	41 11	16·4	38 26	16·3
4. *Bajri* irrigated	4 31	1·9	5 10	2·2
5. Paddy	14 19	5·8	17 31	7·5
6. *Kodra*	14 31	5·9	18 30	7·9
7. *Vagardu*	39 12	15·6	26 6	11·0
8. *Bavto*	0 33	0·3	0 22	0·2
9. *Sundhia* (main crop)	23 30	9·4	15 26	6·6
10. *Sundhia* (2nd crop)	14 13	5·7	5 35	2·5
11. *Jowar* irrigated	1 9	0·5	13 7	5·6
12. Cotton	2 28	1·1	2 5	0·9
13. Cumin	..	..	2 2	0·9
14. Potato	0 22	0·2	1 8	0·5
15. Brinjals	1 0	0·4	..	..
16. Gram	..	..	3 6	1·3
Grass land ..	1 22	0·6	1 13	0·6
Total ..	251 36	100·0	237 0	100·0

It would be seen from the above table that the total area under crops is more than that of the cultivated area. The difference is due to double cropped area which amounted to Acres 18, gunthas 13. Area under tobacco, grains, fodders and miscellaneous was 36 per cent., 45·1 per cent., 15·3 per cent. and 3·6 per cent. respectively. The changes in the first two above-mentioned groups in comparison with the previous year are very insignificant. The fodders and miscellaneous groups however showed a difference of 0·9 per cent. and 1·9 per cent. respectively. The yield figures given in table No. 2 below indicated that they were very low in comparison with the previous years for all crops except tobacco, *tur* and *sundhia*. Tobacco stood 4th in rank, *tur* third and *sundhia* also third.

Table No. 2.

Crops.	Average yield per acre during				
	1933–34.	1934–35.	1935–36.	1936–37.	1937–38.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
1. *Bajri*	500	563	704	521	474
2. *Vagardu*	1,110	1,159	867	732	727
3. *Kodra*	840	962	1,165	685	649
4. Paddy	1,060	1,267	1,514	795	741
5. Tobacco	527	425	526	601	477
6. *Tur*	..	511	637	142	501
7. *Sundhia* ..	1,281 (Bundles)	873 (Bundles)	869 (Bundles)	1,013 (Bundles)	912 (Bundles)

Labour.—The sources of labour both human and bullock for the production of crops were Home labour, Exchange labour, Day labour and labour Gratis. The proportion of the above sources worked to 59·5, 8·3, 24·3 and 7·9 per cent. respectively for male labour, 47·0, 0·0, 50·5, 2·5 respectively for female labour and 50·2, 24·0, 7·9, 17·9 respectively for bullock labour. The social status brought about

considerable variation in the supply of labour by various sources as revealed by the table given below :—

Table No. 3.

	Male labour.		Female labour.		Bullock labour.	
	Patidars.	Non-patidars.	Patidars.	Non-patidars.	Patidars.	Non-patidars.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Home labour ..	51·5	73·3	27·5	77·2	45·1	59·1
Exchange labour	8·6	7·8	..	..	22·6	26·6
Day labour ..	31·3	12·1	69·2	21·6	11·5	1·7
Gratis ..	8.6	6·8	3·3	1·2	20·8	12·7
Total ..	100·0	100·0	100·0	100·0	100·0	100·0

The strength of the home human and bullock labour could be judged from the number of male and female members in the families of farmers and the number of bullocks maintained by them in the table given below :—

Table No. 4.

Village.	Number of families.	Men.	Women.	Children.	Heads per family.	Number of bullocks.
Samarkha ..	10	17	17	24	5·8	8
Kaeer ..	10	12	11	22	4·5	7
Nisaraya ..	11	25	15	21	5·8	11
Total ..	31	54	43	67	5·3	26

Labour and its requirements for crops.—The total labour for growing crops on all the 31 farms amounted to 10,911·7 units of humar labour and 2,912·0 units of bullock labour. The labour requirements of the various crops were as given in the table below :—

Table No. 5.

Crops.	Human labour units for all farms.	Per cent.	Bullock labour units for all farms.	Per cent.
Tobacco	5,374·0	49·3	1,482·75	50·9
Vagardu, kodra and paddy mixture.	2,339·5	21·4	526·5	18·1
Bajri mixture	1,702·0	15·6	378·0	13·0
Bajri (irrigated)	255·25	2·3	54·5	1·9
Sundhia (main crop) ..	317·0	2·9	188·5	6·5
Sundhia (2nd crop) ..	51·75	0·5	40·0	1·4
Jowar (irrigated)	370·5	3·4	116·0	4·0
Potatoes	182·75	1·7	52·0	1·8
Cumin	131·5	1·2	5·0	0·1
Gram	46·0	0·4	23·0	0·8
Cotton	53·5	0·5	7·25	0·2
Bavto	37·5	0·3	15·0	0·5
Grass land	1·5	....	....	....
Others	49·0	0·5	23·5	0·8
Total ..	10,911·70	100·0	2,912·0	100·0

The per acre human labour requirement of some of the important crops like tobacco, paddy, *kodra* and *vagradu*, *bajri* mixture, *sundhia* (main crop) and potato irrigated worked to 62·71, 36·19, 44·01, 20·13, 152·29 units respectively, whereas the per acre bullock labour

requirements for the same crops worked to 17·25, 8·24, 9·78, 11·9, 43·33 units respectively.

Utilisation of home labour.—The total available home male labour amounted to 18,451·5 units and home bullock labour 8,419·9. The percentage distribution of the total available labour units in the case of male labour and bullock labour is as under :—

Table No. 6.

	Male labour.	Bullock labour.
	Per cent.	Per cent.
1. Units used on the farm	25·5	15·8
2. Units used for cutting	6·7	7·6
3. Units exchanged	2·6	....
4. Units given gratis	2·0	3·9
5. Units used on hire work	11·1	2·0
6. Units used for miscellaneous work	19·1	3·7
7. Units used for social functions	6·0	....
8. Units without work..	26·6	67·0
9. Units not available (sickness)	0·4	....
Total available units ..	100·0	100·0

The table above points out that 26·6 per cent. of the total available in the case of male labour and 67·0 per cent. in the case of bullock labour goes without work. But it cannot be from this concluded that 26·6 per cent. for male labour and 67 per cent. for bullock labour are available continuously. It is scattered over the whole year. In some months both farmers and bullocks are practically fully occupied as seen from the table below showing percentage of monthly distribution of home men and bullock labour.

Table No. 7.

Months.	Working units to total available units for men.	Working units to total available units for bullocks.
	Per cent.	Per cent.
May (13th to 31st)	69·6	47·4
June	72·4	56·9
July	77·0	56·0
August	77·7	60·9
September	73·5	23·3
October	82·6	41·4
November	70·1	16·0
December	70·9	9·8
January	73·8	12·1
February	70·9	14·4
March	71·8	20·8
April	64·1	22·5
May (1st to 12th)	54·9	26·3
Average ..	73·4	33·0

The women were supposed to be fully occupied in their household work and in the management of dairy business—an adjunct to farm business.

Capital.—The figures in respect of capital as an average of inventories of the last five years and reduced to per farm basis given below indicate that the fixed capital per farmer and the debt per farmer increased or decreased almost simultaneously.

Table No. 8.

Year.	Fixed capital.		Live-stock.	Operating capital.		Amount due from others.
	Land and its fixtures.	Houses and cattle shed.		Implements and tools.	Material and cash on hand.	
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1933–34 .. (beginning).	2,542	1,117	160	47	140	60
1934–35 ..	2,513	1,657	142	44	159	63
1935–36 ..	2,780	1,754	145	45	147	59
1936–37 ..	2,792	1,710	140	40	136	67
1937–38 ..	2,904	1,724	133	37	104	66

—	Debt Average per farmer.	Increase or decrease over previous year.
	Rs.	Rs.
1933–34 (beginning)	895	..
1934–35	968	73
1935–36	1,087	119
1936–37	1,117	30
1937–38	1,193	76

Costs, receipts and income.—The position of the costs, receipts and income from farming, dairying and from miscellaneous sources separately for five years was as follows :—

(*a*) *Farming.*

Year.	Average holding.	Total value of yield.	Cost excluding wages for family labour.	Family labour income.	Farm business income.	The average farm business income per unit of human labour.
	A. g.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
1933–34 ..	5 18	833 15 1	357 7 8	3 8 7	90 2 11	0 5 7·5
1934–35 ..	7 32	463 13 3	365 10 7	43 2 8	123 15 6	0 8 4
1935–36 ..	7 18	397 11 11	362 9 10	35 2 1	129 3 2	0 9 6·5
1936–37 ..	8 5	448 1 6	425 4 5	22 13 11	127 0 5	0 9 3·6
1937–38 ..	7 25	438 15 3	404 9 0	34 6 3	136 15 7	0 10 1·7

The increase in the average farm business income per unit of human home labour used on the farm in spite of low yields was due to the increase in prices especially of cereals and fodders and slight increase in the yield of tobacco.

(*b*) *Dairying*.—As stated previously, dairying gave employment to women folk of the farmers. The farmers generally kept one or two buffaloes for production of milk and milk products. The production of milk for all 31 farmers during the year was 85,216½ lbs. out of which 39 per cent. was sold to creamaries, 45 per cent. was turned into curds for preparing ghee and the remaining 16 per cent. was consumed by the farm families. The consumption of milk and ghee during the year worked to 7·2 lbs. of milk and 30 tolas of ghee respectively per month per member of the farmers' family. This was an increase by 3 lbs. in milk and 5 tolas in ghee per month per member over the previous year.

Costs and receipts.—The position in respect of costs and receipts in dairying business for the past five years was as under :—

Table No. 9.

Year.	Total cost.	Total income.	Family labour income.	Dairy business income.	Average diary business income per farmer.
	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
1933-34 ..	2,769 4 0	3,583 1 0	823 10 0	1,199 15 6	38 11 4
1934-35 ..	3,008 4 5	3,940 9 0	932 4 7	1,317 5 7	43 2 2·9
1935-36 ..	2,873 3 11	3,755 13 8	882 9 9	1,278 12 7	41 4 0·2
1936-37 ..	3,649 12 3	4,880 11 9	1,230 15 6	1,690 4 0	54 2 10·6
1937-38 ..	3,174 11 3	4,432 8 9	1,257 13 6	1,685 3 6	54 5 9·5

The dairy business income per farmer is practically the same in the year under report as in the previous year but the trend is upwards.

Miscellaneous income.—The following table gives the details of the kinds of miscellaneous incomes derived by farmers. It is interesting to point out that the earnings per *patidar* farmer worked to Rs. 106-1-10 whereas those for the non-*patidar* farmer worked at Rs. 65-3-8.

Table No. 10.

——	*Patidars* (20 in number).	Per cent.	Non-*patidars* (11 in number).	Per cent.
	Rs. a. p.		Rs. a. p.	
1. Wages earned	2 8 0	0·1	243 6 0	33·9
2. Business income	797 8 6	37·6	184 8 0	25·7
3. Carting charges	41 0 0	1·9	116 10 9	16·3
4. Service	804 6 6	37·9	45 0 0	6·3
5. Income from fruit trees	35 2 0	1·7	73 6 0	10·2
6. Rent of house and land	20 0 0	0·9	....	....
7. Watching	....	....	44 8 0	6·2
8. Rent of leased land	421 11 9	19·9	10 1 6	1·4
Total, income ..	2,122 4 9	100·0	717 8 3	100·0
Average per farmer ..	106 1 10	....	65 3 8	....

Total business income.—Adding the business income from farming, dairying and miscellaneous sources the position of the earnings of the farmers under study was as below :—

Table No. 11.

Year.	Farm.	Dairying.	Miscellaneous.	Total.	Per member per day.
	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
1933-34 ..	90 2 11	38 11 4	106 11 3	235 9 6	0 1 11·6
1934-35 ..	127 2 9	42 7 11	78 14 1	248 8 9	0 2 0·0
1935-36 ..	130 9 2	41 4 0	126 9 9	298 7 0	0 2 3·6
1936-37 ..	127 0 5	54 8 4	107 5 5	288 14 3	0 2 1·6
1937-38 ..	136 15 7	54 5 9	91 9 8	282 15 1	0 2 5·1
Average of five years.	122 6 2	46 4 3	102 3 8	270 14 1	0 2 1·9

The above table points out that in the year under report farm business income is the highest, dairy business income practically same as in last year but the miscellaneous income is much less compared to last year. The income per member per day which worked to 0–2–5·1 is the highest. This is due to decrease in the number of family members.

Research (B).

The data of the study of economics of a dry tract in the Sholapur district was analysed and presented in a form of a bulletin. The summary of the data is as below.

1. The rainfall averaged to about 20 inches and its distribution was not opportune as pointed out by the season during the three years' investigation. Nearly 69 per cent. of the soil fell in the class lower than 8 annas.

2. The average proprietary holdings consisted of 17 Acres, 21 gunthas and the average cultivating holding was brought up to 22 Acres, 38 gunthas by adding 5 Acres 17 gunthas of land taken on lease. The increase in the land taken on lease pushed the cost up on account of the rent and thus decreased the farm business income and family labour income.

3. The cropping of the tract consisted of cereals, fodders and pulses to the extent of 86 per cent., oilseeds and safflowers 11 per cent. and the rest 3 per cent. The cropping of the farmers was such that 94 per cent. of the average was under cereals, fodder and pulses and of the remaining, 3 per cent. was under fibres.

4. Out of the various sources of labour in farming in the case of male labour, home labour contributed to the extent of 70·79 per cent., exchange labour 19·63 per cent. and hired labour 7·63 per cent. In the case of female labour as much as 61·02 per cent. was from home and 35·8 per cent. hired. In the case of bullocks 67·17 per cent. was from home and 32 per cent. exchange. But the utilisation of labour revealed that farming as such occupied men, women and bullocks only to the extent of 30·37 per cent., 22·30 per cent. and 30·13 per cent. per month respectively of the available labour supply.

5. The net worth of the farm was Rs. 3,092–4–5 out of which real estate formed 88·45 per cent. and livestock 9·37 per cent. The liabilities were found to be about 4 per cent. of the net worth of the farm. The cost excluding wages of family labour amounted to Rs. 3,581-14-8 per farmer out of which, out-of-pocket expenses made up 75·32 per cent., rent of owned land excluding assessment and local fund cess 11·82 per cent. and interest on working capital 12·86 per cent. The farm business income per unit of home labour supplied to farming worked to Re. 0–4–9.

Marketing Survey of Agricultural Commodities.

Reports and surveys.—Preliminary reports on the survey of the Co-operative marketing of Rape and Mustard seed, Markets and Fairs, Potatoes, Citrus fruits and Ghee and butter were completed during the year.

1. *Co-operative movement in Bombay Province.*—The saliant point brought out by the report was the development of agricultural non-credit movement in comparison with agricultural credit, the details* of which for 1935–36 are given below :—

	Number of societies.	Number of members.	Share capital. (Paid).	Reserve fund.	Working capital.
			Rs.	Rs.	Rs.
Agricultural credit societies, limited and unlimited.	3,627	2,03,578	21,67,098	69,68,514	2,97,97,016
Agricultural Non-credit, limited and unlimited.	284	58,124	5,78,552	5,18,903	23,46,291

* Annual Report of the co-operative societies, Bombay Province, for 1935–36.

2. *Rape and Mustard Seed.*—The area under rape and mustard seed varied between 16,000 to 18,000 acres. The home production amounting to 2,500 to 3,000 tons was supplemented by 8,000 tons. Out of the above 6,000 tons were exported to France, Germany, Belgium, Netherlands and the rest is consumed in the province. The rape seed oil was used as a vegetable oil and mustard seed oil for frying purposes.

3. *Markets, Fairs and Produce Exchange.*—Fairs held annually, small and big, numbered 1,111 out of which 45 were of permanent nature attended by about 30 to 40 thousand people, 89 by about 10,000 and the remaining by less than ten thousand. It was found that they were unimportant from assembling point of view. The turnover of consumption of goods was estimated somewhere between Rs. 50 to Rs. 60 lacs of rupees. The weekly markets totalled about 956. It was observed that they were very few in Gujarat and Konkan. Many facilities like provision of market committee, provision of shade and water arrangement were found wanting.

4. *Potato.*—The acreage under potato was 23,000 acres, 75 per cent. of which was in Poona District. The production worked to about 1,746,000 maunds. The annual *per capita* consumption in this province was estimated at about 7·74 lbs. The consumption was as high as 32 lbs. in Bombay, Ahmedabad and Surat. It was found that efficient

transport and storage facilities were pre-requisite to attempts at standard grades and organised marketing.

5. *Citrus fruits.*—The total area under citrus fruit was 10,068 acres out of which 7,510 was under oranges, 2,512 acres under sour lime and 42 acres under pomeloes. The annual production or oranges approximately amounted to about 560,000 maunds and about 265,000 maunds of sour limes both together valued approximately at Rs. 42,00,000. The annual *per capita* consumption of oranges was estimated at 2·06 lbs. For Bombay it was estimated at 10·4 lbs. for Ahmedabad 6·9 lbs., for Poona 3·2 lbs. and for rural areas 1 lb. It was observed that there was considerable scope for organising grading, improvement in packing, storage and quick transport and for developing industries for preparing by-products.

6. *Ghee and Butter.*—Bombay produced 397,236 maunds of ghee and 54,750 maunds of creamary butter. The imports of ghee were on their increase from other provinces and states. The per head consumption of ghee was estimated at 8·7 lbs. in urban areas and 2·7 ozs. in rural districts, and of creamary butter at 4·3 ozs. in urban areas only. Adulteration was found to increase. Grading and systematic marketing needed proper control of adulteration and adequate propaganda in the preparation of ghee and butter. It was observed that there was wide scope to improve the industry if marketing were improved.

The surveys of the marketing of following commodities were continued :—

Cereal crops.—Sugar and Gul, Maize, Barley, Gram.

Oilseed and Fibre group.—Jute and other fibres, Cocoanut.

Special crop group.—Mangoes, apples, Pineapples, Cashewnuts.

Animal Husbandry group.—Fish, Lac, Sheep and Goat, Wool and Hair.

In addition to the surveys of fresh commodities the supply of supplementary information on the reports submitted in previous years so as to make it up-to-date till the date of final publication of the reports by the Central Staff and the supply of other additional information occupied considerable time of the staff. The latter half of the year was marked by enquiries from the public which also were attended to.

Development work—Grading.—(*a*) Standards for Mosambi were fixed and a grading station was organised at Rahuri in Ahmednagar District for the introduction of the standard grades into markets and for popularising the " AGMARK " labels. The grading of Mosambi went on from 22nd December to 21st April, the finances being provided by the Agricultural Marketing Adviser. The results are being compiled.

The results of grading of grapes were compiled and it was found that graded consignments fetched Rs. 0–2–3 more per basket. The data is now published in the form of a leaflet.

(*b*) Three merchants in Bombay were authorised for grading of eggs and they were supplied with grading machines by the Agricultural Marketing Adviser. One of them started grading. Attempts are still continued to start grading work in producing centres rather than in consuming ones.

(*c*) The possibilities of grading ghee at Viramgaon, Mehmedabad and Belgaum were studied and submitted. A scheme for starting grading work was submitted to the Director of Agriculture, Bombay Province, Poona. The initial cost of setting up laboratory was found to be the limiting factor.

Shows.—The stalls for exhibiting the activities of marketing section were organised at District Agricultural Show held at Sanand, Broach and Belgaum. The exhibits were so made as could give the spectators a connected link of the whole marketing activities right from the preparation of produce to the stage it reached the consumer. The distribution of consumer's rupee and some of the malpractices were minutely observed by cultivators. It was observed agriculturist took interest in the stall being a new addition to previous shows and expressed it was this what they needed urgently. In the Poona Health Exhibition too grades, Grade labels, use of adulterants especially in milk and ghee were brought to the notice of the consumers. They were also informed as to which the marketing section was endeavouring to do in the sphere of food products.

Price intelligence.—Just to make a beginning in this line the weekly prices of buffaloes arriving in Bombay were collected and are being yet collected and reported to the *Times of India*, which gave publicity every Wednesday. This was with a view to informing the sellers in Rohatak and Mehsana from where the buffaloes arrived daily. The activity requires to be extended to all commodities especially to perishables. A scheme for development of market intelligence is submitted to Government to make a humble start.

Regulated markets.—The preliminary information required to prepare cases for the regulation of markets under the existing Regulated Cotton Markets Act was collected. It was felt that such an act should be for all agricultural commodities and therefore an Act after studying the existing acts was prepared and submitted to the Director of Agriculture, Bombay Province, Poona.

Conferences.—During the year under report Groundnut and Ghee Conferences held in Bombay on 27th September 1937 and 23rd January 1938 respectively to fix up grades, were attended and views offered. The Provincial Marketing Officers' Conference held on 14th April 1938

was also attended at which notes on regulated markets and weights and measures were read and discussed.

Leaflets.—A leaflet regarding the work of grading of grapes at Nasik and its usefulness was compiled and translated in Marathi for issue to the growers.

There were no cases of corruption in this section during the year under report.

PUBLICATIONS.

1. Proposes of Work in Agricultural Economics. (Agril. College Magazine, Vol. XXIX, No. 1, 1937.)
2. The consumers' Co-operative Movement and the College of Agriculture Co-operative Stores. (Agril. College Magazine, Vol. XXIX, No. 2, 1937.)
3. The Basis of Rural Rehabilitation. (Agril. College Magazine, Vol. XXIX, No. 3, 1937.)
4. Grading of Grapes in the Nasik District (Leaflet).

M. B. GHATGE,

Professor of Agricultural Economics and Provincial Marketing Officer, Bombay Province, Poona.

College of Agriculture: Poona, 16th July 1938.

Programme of work under the Professor of Agricultural Economics and Provincial Marketing Officer, Bombay Province, Poona, for the year 1938-39.

1. To study the farm family budgets of farmers in the Charotar Tract of Gujarat.
2. To compile the data of the economic study of Charotar Tract.
3. To teach the subject of agricultural economics in the College.
4. To supervise the marketing survey work, consisting of collection of data and its compilation in preliminary reports of the commodities already under investigations; collection of supplementary information required by Central Staff.
5. To take up development work if the schemes submitted are sanctioned by Government.

M. B. GHATGE,

Professor of Agricultural Economics and
Provincial Marketing Officer,
Bombay Province, Poona.

College of Agriculture :
Poona, 16th July 1938.

APPENDIX Q.

Summary of Work done under the Professor of Agricultural Engineering, Physics and Mathematics, Agricultural College, Poona, for the year 1937–38.

Administration.

I was in charge of the section during the year except from 10th May 1937 to 9th July 1937 when Mr. A. A. Vasavada acted for me. This section attends to the teaching duties at the College, Research on soil Erosion and District Enquiries and advice on Land Development.

Staff.

The staff consists of two assistants—a Lecturer and a Demonstrator, both in the upper subordinate service.

I. Teaching.

Two subjects (1) Physics and Mathematics, (2) Agricultural Engineering, together with their laboratory and field work are taught by this section to the Agricultural students. The students did well in both the subjects in the University Examination held in March 1938.

Physics and Mathematics.

Class.	Number appeared.	Number passed.	Percentage passed.
F. Y. Sc. (Agri.)	86	65	75·5

Agricultural Engineering.

Class.	Number appeared.	Number passed.	Percentage passed.
S. Y. Sc. (Agri.)	63	56	88·88

From 10th June 1938 onwards the section with its present staff has also to take up additional teaching work due to the introduction of the Forest Rangers Course in the College. The students will be trained up in Physics, Surveying and Levelling, both in theory and in practicals.

II. Research.

Levels for all the Research schemes on hand for this year have been taken and some of them plotted up. The record is maintained and some of the results are being worked up.

1. Study of Soil Erosion.

(*i*) 30 *Acre plot near Chatursingi hill.*—There were some two days of heavy rainfall from middle to end of June followed by lighter showers in July-August. During September there were 3 days with rainfall of 2 to 3 inches which caused more erosion as compared to June to August rainfall.

Statements showing silt collected in the trenches below the sub-plots.

Period.	4 Guntha cultivated.	4 Guntha uncultivated.	3 Guntha cultivated.	3 guntha uncultivated.
	Lbs.	Lbs.	Lbs.	Lbs.
Mid-June to end of August	290	496	207	303
September and October	689	771	540	563
Total ..	979	1,267	747	866

Silt at the rate of nearly $4\frac{1}{2}$ tons to the acre was washed down from cultivated plots and 5 to $5\frac{3}{4}$ tons per acre from Uncultivated ones. The average depth of washing amounts to ·018″ from the cultivated and ·022″ from the uncultivated plots.

As a result of the heavy showers the erosion this year in the cultivated plots is about twice as much as that of last year. The erosion on the uncultivated plots is slightly more than that of last year and it seems that even in a fairly eroded area like the one where the observations are taken, further erosion continues.

Rainfall Statement.

Year.	Total Rainfall.	Number of rainy days.	Number of days with rainfall of						Rainfall for					
			0·5" to 1"		1" to 1·5"		1·5" and above.		June.	July.	August.	September.	October.	November.
			June to August.	Sept. to October.	June to August.	Sept. to October.	June to August.	Sept. to October.						
1935-36	23·25	77	7		1		6		5·11	4·96	4·9	3·31	5·64	0·09
1936-37	15·22	71	6		2		1		3·61	1·61	1·34	1·11	0·46	2·27
1937-38	30·38	89	8	4	*Nil.*	*Nil.*	2	4	5·85	5·84	1·16	12·50	2·68	0·60

Note.—September October heavy showers seem to give a higher rate of erosion than the first seasonal showers.

(*ii*) *Erosion in Gullys.*—Two gullys under observation in the plot show the continuity of erosion of bed and banks.

(*iii*) *Lines on steep and moderate grades.*—These continue to show a slight degree of further erosion.

2. Katraj Valley Terrace observations.

Some of the terraces show silt deposition due to September showers.

3. Diva Ghat Area observations.

Here also the loose stone bunds put up across the gullys have shown silt filling as in the past. A larger bund has been put up across one of the gullys to note the filling effect.

4 and 5. Karjat and Pashan Valley Terraces observation.

These lines continue to be under observation.

6. Erosion in Gullys near Gujarat Rivers.

The undersigned visited lands near Meshva, Mahi and Sabarmati Rivers in Kaira and Ahmedabad districts where the soil is light sandy and deep at places. Such soil is very easily washed off by the rains, causing gullys, which develop fast and cut deep, some times causing damage to village sites. It is understood that similar conditions are met with in South Gujarat along the banks of Narmada and other Rivers. As a result of my visits, the Deputy Director of Agriculture, Surat, was addressed in March 1937, bringing to his notice the serious menace of erosion and gullying in Gujarat. I am glad to know that a Bunding Overseer is being provided.

It is proposed to take up a suitable site for observation.

7. Erosion and Silting observations in Southern Division and South-Central Division through the Agency of the Bunding Officers.

Both the Bunding Officers of South-Central Division and Southern Division are busy for full time with the bunding advice and hence this has to be dropped for the present.

8. Register of Land Development Schemes.

The undersigned visited some typical places in the Districts, where erosion takes place and preventive measures adopted. Suggestions for modifications where necessary were offered. It is now proposed to call for a list of important land development schemes every two years for the register purpose.

9. *Compilation of Erosion Development literature.*—All available and latest literature on the subject of India and foreign countries is being collated and compiled.

10. *Tidal Bunds and Erosion in Gujarat and Bhal tract.*—Advice on preventive measures is offered where necessary in case of former. The Deputy Director of Agriculture, Surat, was approached to have an experimental scheme formulated to deal with the Bhal lands.

III. Advisory and Propaganda.

The following work was attended to in the Districts—

I. *Northern Division—*

(*i*) *Ahmedabad and Kaira Districts.*—The sites of erosion and gullying in Ahmedabad and Kaira Districts were visited and further necessary

action has been pointed out to the Deputy Director of Agriculture, Northern Division.

II. *North Central Division—*

(*i*) *Satgaon, Gorashi and Tarwad—West Khandesh.*—At the request of the Deputy Director of Agriculture, North Central Division the undersigned in company with the Agricultural Chemist visited the lands near the villages mentioned above, as they have become waste lands due to erosion, improper drainage and salt accumulation. The Deputy Director of Agriculture has been advised to get the area surveyed before taking up any further steps.

(*ii*) *Dahisar Nadi Bunding Project.*—As desired by the Collector, Bombay Suburban District, a suitable site was shown and instructions for survey and estimates were given to the Engineer, Bombay Suburban District Local Board, who is to submit them for the Collector's approval.

(*iii*) *Nasik.*—Places near Nasik, Rajur, Pimpalgaon farm, etc., were visited and erosion and Land Development works were inspected.

(*iv*) *Dhulia.*—A site was selected for a tank adjacent to the Pimpri village Gaushala farm near Dhulia. Survey was carried out and plans are sent with a recommendation that it may be undertaken by Government. Places near Morani, etc., were visited for land Development and erosion work.

(*v*) *Yeranzada.*—A contour survey of the Co-operative Irrigation Farm at Yeranzada near Badlapur was carried out with a view to lay out the farm for Bunding, etc., and plans sent to the Deputy Director of Agriculture, Nasik, for further action.

(*vi*) *Ambarnath.*—At this place the water exists at places on the surface and it was suggested that Bore holes be taken and water pumped therefrom.

(*vii*) *Tungar near Bassein.*—Survey for a Dam at Tungar was carried out.

(*viii*) *Uran.*—Advice for terracing and development of Sir Dossabhai Bhiwandiwalla's estate situated at Uran was called for through the Deputy Director of Agriculture, North Central Division. The area was visited and suggestions offered.

III. South Central Division.

(*i*) *Ahmednagar District.*

(*a*) The Bunding Schemes at Bhandgaon, Jeur and Hunga were visited and suggestions offered to the Bunding officers.

(*b*) The Drainage schemes at Khandala, Deolali and Belapur were also visited to see the layout and the resulting improvement.

(*c*) The Belvandi soaking compartment scheme was visited. It was found that there were some breaches which were not attended to and they caused erosion and gullying. This was pointed out to the Deputy Director of Agriculture, South Central Division, who was requested to take up the question further.

(*d*) As a result of my tour, the Irrigation Department was approached to allow the cultivators to use the spoil from the canal excavation for bunding. The permission is granted.

(*ii*) *Sholapur District.*

The Bunding Schemes at Nimbargi were visited and the result of bunding noted.

The Bunding on the Dry farming Area at Sholapur and erosion study was also gone into.

(*iii*) *Satara District.*

Rural reconstruction survey was carried out during October for 10 days by the Rural Reconstruction Association in Satara District. The inauguration of the work was done by the Honourable Mr. Morarji R. Desai, Minister for Revenue and Agriculture. All the staff members of this section fully co-operated with the Association in Surveying tank schemes and finding out sites for location of tanks. In all the three parties of this section surveyed 23 schemes for tanks and located 12 sites for further work. About 30 miles of fly levelling was carried out in connection with the schemes.

(*iv*) *Poona District.*

(*a*) *College Farm.*—Levelling was carried out for the B and C Divisions of the College farm with a view to lay out Bunds and location of the bunds was pointed out in the area.

(*b*) *Economic Botanist's area.*—Levels were taken for realigning a water channel in the above area and sent to the Economic Botanist for necessary further work.

IV. Southern Division.

(1) *Bijapur District.*

The Dry farming station was visited to see and study the erosion damage and anti-erosion measures adopted and their effect.

V. Shows.

District Agricultural Show, Ahmedabad.—The undersigned was invited to prepare and demonstrate Land Development and anti-erosion measures by models at Sanand where the show was held. An assistant was deputed for this purpose and five models of schemes, each nearly $10' \times 10'$, were constructed for demonstration in the show ground. They dealt with Bunding, gully erosion prevention, percolation tanks, infiltration gallery and Pat Bandhara and Soaking Compartments.

A certificate has been granted by the show authorities for this item.

VI. Classes.

(*i*) *Bunding classes conducted by the Deputy Directors North Central Division, South Central Division and Southern Division.*—Government sanctioned money to train up and prepare cultivators in laying out Bunds, wasteweirs, etc., at different centres under the three Deputy Directors. The undersigned was associated for general supervision, inspection and co-ordination of work at the various centres. The undersigned had thoroughly discussed the plans of teaching with the Deputy Directors and carried out tests at various centres.

The following centres were visited :—

Poona Division— { Talegaon Dhamdhere. / Vaduj.

Nasik Division— { Mehrun. / Andarsul.

Dharwar Division—Bagalkot.

(*ii*) *Assistant and Deputy Collectors' Class.*—Lectures with visits on erosion and irrigation were given to the officers deputed for the special training in Agriculture and allied subjects.

(*iii*) *Army Rural Reconstruction Class.*—An assistant was deputed to give lectures in Hindustani to the men of the various Army Units on five different occasions on the subject of "Kalar" Soil and Drainage.

Corruption.

Proper supervision is maintained to see that there is no corruption in this section and there is no case of corruption to report during the year under report.

J. P. TRIVEDI,

Professor of Agricultural Engineering,
Physics and Mathematics.

College of Agriculture,
Poona, 15th July 1938.

Programme of work under the Professor of Agricultural Engineering, Physics and Mathematics, Poona, for the year 1938-39.

The following work will be taken up during the year :—

(1) Further observations on the Erosion plots near the College and Bunding and other preventive measures.

(2) Diva Ghat Forest area—observing effect of erosion and Bunding and gully erosion prevention.

(3) Observations in the Katraj Valley.

(4) Observations in the Pashan Valley.

(5) Observations in the Karjat Rice Terraces.

(6) Erosion and silting observations in the Districts if possible.

(7) Visits and advisory work in the District for Land Development.

(8) Compilation of Erosion and Development literature.

J. P. TRIVEDI,

Professor of Agricultural Engineering, Physics and Mathematics.

COLLEGE OF AGRICULTURE,
Poona, 15th July 1938.

APPENDIX R.

Summary of Work done under the Professor of Entomology, College of Agriculture, Poona, during the year 1937-38.

Administration.

During the year under report I held charge of the Section of Entomology.

Staff.

There was no change in the staff.

Work.

The work done by this section is as follows :—

I. Teaching.

II. Investigations and observations on important insect pests.

III. Advisory work.

IV. Service to the public.

I. Teaching.

This section has to teach General Zoology to the First Year and Entomology to the final year. During this year two more students for post graduate work (M.Sc.) have been taken up.

II. Investigation Work.

Investigations and observations were carried on, on the following pests :—

(1) Control of Aphis on Peas.

(2) Control of Aphis on Cabbage.

(3) Pests on Fig.

(4) Control of Citrus scale.

(5) Fruit flies.

(1) *Control of Pea-aphis.*—Tobacco waste extract has been found to give good results in controlling aphis, and it was intended to try the material against peas at Saswad. In order to convince the owners about the efficacy small plots were sprayed with tobacco waste extract. But as there was reinfection from the surrounding unsprayed area, the trial was not successful.

(2) *Control of Cabbage aphis.*—According to the programme of the last year, spraying trials were taken up on the cabbage crop in Modibag. The cabbage crop on an area of 12½ gunthas was taken for spraying. This area was divided into three plots. In all 3 sprayings were given. First general spraying was given to all the three plots. Two sprayings were given two plots and three sprayings to only one plot. This differential treatments were given with the intention of finding out as to how far the aphis-population was controlled and also to know how it affected the out-turn. Three sprayings do show comparitive differences in the population of aphis, and if, immediately after a spraying a counting is taken, great reduction is noticed. The control plot which did not receive any treatment always had the largest population. The results of sprayings could not be correlated with the out-turn, as the whole crop was leafy and there were hardly any heads formed.

(3) *Pests on Figs.*—Fig gardens have been under observation for the different pests they suffer from. This year jassids were very few. In one garden besides jassids two new pests—Mites and Scale insects (Pseudococcus sp.) were observed and the latter was successfully controlled by the spraying of fish oil rosin soap. Large black ants are always found to be associated with the pest.

(4) *Control of Citrus scale*—(Chrysomphalous aonidum).—This is one of the serious pests of the Citrus plants This is controlled by spraying of fish oil rosin soap. This trial was done at Vadala (Pravara) in the garden of Mr. Tyabji. 50 trees (10 to 12 feet high with an expanse of about 10 feet) were sprayed. As the trees were thoroughly drenched, at an average about two gallons of solutions were required per plant; the insects on leaves were all found to be killed completely; the kill per cent. however on fruits was observed to be about 60 per cent. on the second day of spraying. Complete kill is obtained on later days. The efficacy of this treatment is known and acknowledged by the garden owners. It is an item for propaganda for the Department.

(5) *Fruit flies.*—Trapping of fruit flies is being done for the last two seasons. Clensel—a proprietory product has been giving very consistent results. Its substitute—scrub ammonia and vanilla essence—has not shown any better results and besides it is more costly then clensel. The results of observations for the last 12 months are as follows :—

The total number of flies trapped throughout the year was 10,428, out of which 4,790 were males and 5,638 were females. The distribution of the flies according to the classification is as follows :—

			Males.	Females.
Chætodacus	ferrugineus	..	3,937	3,920
,,	correctus	..	38	47
,,	zonatus	..	452	1,356
,,	diversus	..	24	38
,,	cucurbitæ	..	339	277

From these figures it is clearly seen that chætodacus ferrugineus and chætodacus zonatus and chætodacus cucurbitæ are the prevalent species.

The fruits that are under observation are (1) Mango, (2) Guava, (3) Citrus (4) Chikoo and (5) Cucurbits.

The catching trials so far have been useful in ascertaining the occurrence and distribution of the different species prevalent in this province. Of the above crops mango and guava are the most attacked. The trapping of flies by Clensel, alone, will not help in any way their control and hence besides trapping, poison baiting will be tried and the results will be watched.

(6) *Betelvine Bug Investigation.*—This is a scheme for the investigation of the betelvine bug—Disphinctus mæsarum, subsidised by the Sir David Sassoon Trust Fund. The work is being done at Bassein (District Thana) under my guidance. The programme of work for the season under report is (1) survey of the pest and (2) study of the life history of the bug.

III. Advisory Work.

During the year under report 337 inquiries were received from various sources and these were attended to by correspondence and by actual visits by me and the Lecturer. The following is the list of the inquiries which will clearly show the varied nature of the information asked for:—

1.	Pest of cereals	25
2.	Pest of fruits	58
3.	Pest of oil seeds	4
4.	Pest of pulses	4
5.	Pest of sugarcane	9
6.	Pest of vegetables	15
7.	Silk worms	6
8.	Fumigation of seeds	2
9.	Katra caterpillar	5
10.	Grasshoppers	8
11.	Tobacco	5
12.	Ginger	1
13.	White ants	10
14.	Insecticides	11
15.	Identification of insects	5
16.	Trials of insecticides	4
17.	Supply of materials	15
18.	Phytopathological certificates	106
19.	Lac	5
20.	Bee-keeping	12
21.	Rats	4

The Professor of Entomology toured for 47 days, and visited 28 places for advisory and investigational work. The Lecturer toured for 46 days and visited 33 places. The Professor of Entomology gave series of lectures in Hindi on insect pests to the different Battalions at the Military Head Quarters in Poona, according to the scheme of Rural Education in the Army. The Lecturer in Entomology, also attended the Horticultural classes and lectured in Marathi on the pests of fruits.

IV. Service to the Public.

There has been an incessant demand from the Agricultural Officers of the Province as well as from various Institutions regarding the supply of insect pests, insect show cases, silk worms, and other materials for demonstration purposes. All these have been complied with.

Among the activities under this item, it may be mentioned that Karnatak Agricultural Show held at Belgaum in January 1938, was the most important one. I was appointed as one of the Sectional Secretaries and was in charge of the Pestology Section. Besides the show cases exhibiting the principal pests of the crops of the Southern Division, actual demonstrations of the prevalent methods of control of different pests were arranged for.

Lastly I would like to remark that all members of the staff worked satisfactorily. The correspondence and other work has increased considerably. This section was created as an independent section in 1934 and no provision of a clerk was made on the assumption that the section would be able to cope with the work. The Agricultural Sub-overseer has been put on this work in addition to other duties which an Agricultural Sub-overseer is expected to do. Hence a keen necessity for a special clerk is felt.

Corruption.

Proper supervision is maintained to see that there is no corruption in this section and there is no case of corruption to report during the year under report.

T. N. JHAVERI,

College of Agriculture,
Poona, 19th July 1938.

Professor of Entomology, Poona.

Programme of Work for the year 1938-39.

(1) The control of aphis by the tobacco waste extract will be demonstrated in three centres on peas and cabbage;

(2) Experiments and trials of cyanogas and sulphur against mango hoppers will be undertaken in three places, Vengurla, Malvan and Ratnagiri, in Ratnagiri District, Pardi in Surat District, and Borivali and Chembur in the Bombay Suburban area.

(3) Study of the grasshopper-pest in the Belapur area.

(4) Fruit flies—Along with catching the flies, spraying of poison baits will be tried and the results will be watched.

T. N. JHAVERI,

Professor of Entomology, Poona.

College of Agriculture,
Poona, 19th July 1938.

List of Agricultural Bulletins published by the Department of Agriculture and kept for Sale at the Government Book Depot, Bombay.

No.	Year.	*Subject.*	Price. Rs.	a.	p.
32	1908	Locusts in India, by H. M. Lefroy, Imperial Entomologist, Pusa.	0	8	0
33	1909	Cultivation of Broach Cotton in Dharwar, by M. L. Kulkarni, Divisional Inspector of Agriculture, S. D.	0	4	0
34	1909	Night-soil—A Valuable Manure, by G. K. Kelkar, Assistant Professor of Agriculture, Agricultural College, Poona ...	0	4	0
36	1910	First Experiments in the Treatment of Grape-Vine Mildew in the Bombay Presidency, by W. Burns, Economic Botanist ...	0	14	0
37	1910	An Examination of the Seed-Supply of the Broach District, by G. D. Mehta	0	4	0
39	1910	The Salt Lands of the Nira Valley, by Harold H. Mann, Principal, Agricultural College, Poona, and V. A. Tamhane, Laboratory Assistant, Agricultural College, Poona... ...	0	5	0
40	1911	The Cultivation of Guavas near Poona, Dharwar and Limbgaon .	0	12	0
41	1911	Groundnuts in the Bombay Deccan	0	4	0
43	1911	An Examination of the Seed-Supply of the Broach District, Part II	0	5	0
44	1911	Preliminary Study of the Red Rot of Sugarcane in the Bombay Presidency	0	8	0
45	1911	Second Year's Experiments in the Treatment of Grape-Vine Mildew in the Bombay Presidency	0	14	0
46	1911	Seed Selections Series I, Broach Cotton	0	8	0
47	1911	San Hemp	0	4	0
48	1911	Poona Furnace	0	7	0
„	1911	Do. (Marathi)	0	6	0
49	1911	An Examination of the Seed-Supply of the Ahmednagar District, Part I	0	5	0
50	1912	An Examination of the Seed-Supply of the Ahmednagar District, Part II	0	3	0
51	1912	Third Year's Experiments in the Treatment of Grape-Vine Mildew	0	3	0
52	1912	Muscovado Sugar Machinery and its scope for Gul Manufacture in India	0	8	0
53	1912	A Method of improving the Quality of Cotton Seed	0	7	0
55	1913	An Examination of the Seed-Supply of the Poona District ...	0	3	0
57	1913	Improvement of the Indigenous Plough of Western India ...	0	12	0
59	1914	Common Salt and its use as Manure in the Konkan Division ...	0	3	0
62	1914	The Value of Castration of Deccan Bullocks	0	3	0
63	1914	Substitutes for Rab	0	3	0
64	1914	Alkali or Kalar Experiments and Completion Report of Daulatpur Reclamation Station in Sind	0	14	0
65	1914	A List of Diseases of Economic Plants occurring in the Bombay Presidency	0	4	0
67	1914	An Examination of the Seed-Supply of the Sholapur District ...	0	3	0
69	1915	The Rice Stem Borer in the Konkan	0	3	6
70	1915	Improvement of Cotton in the Bombay Presidency (except Sind).	0	3	6
74	1915	Well Waters from the Trap Area of Western India	0	6	0

No.	Year	Subject	Price Rs. a. p.
79	1916	The Cultivation of Guavas in Gujarat	0 5 6
80	1916	List of Seeds available on the Agricultural College Farm, Poona .	0 5 3
81	1916	Note on Fencing Construction	0 6 9
82	1916	Cultivation of drilled Paddy in South Bombay Presidency ...	0 8 0
83	1917	The Spice Gardens of Sirsi in Kanara	0 10 6
84	1917	Seed Selection Series—Kumpta Cotton	0 1 0
85	1917	Note on Cattle in the Bombay Presidency	0 11 0
86	1917	Establishment and Management of the Dairy Farm ...	0 7 0
87	1918	The Utilisation of Inferior Grass Herbage, Experiments at the Tegur Cattle Farm	0 9 0
88	1918	First Report on Fruit Culture as practised round about Tharushah (Sind) in Nawabshah District	0 2 0
90	1918	Work on the Manjri Farms for the years 1915-18	0 7 3
91	1919	The Cultivation of Berseem in Sind—Experiments at Sukkur ...	0 1 0
92	1919	Classification and Description of the Jowars of the Bombay-Karnatak	0 10 3
93	1919	Palm Gul Manufacture in the Bombay Presidency (principally Date Palm)	1 3 9
94	1919	The Sugarcane Borer and its Control	0 4 3
96	1920	Investigations into the nature of the Salt Lands of Sind ...	0 12 0
97	1920	Prickly-Pear as a Cattle Food	1 4 0
98	1920	Fruit Culture as practised near Shikarpur, Sind	0 1 6
99	1920	Rice Cultivation in the Larkana District, Sind	0 8 0
100	1920	Fodder Crops of Western India	2 1 0
101	1920	Fruit Culture in Palitana and Jamnagar	0 8 6
102	1920	Investigations on Potato Cultivation in Western India ...	1 15 0
103	1920	The Book of the Mango	3 5 0
		Do. do. (Marathi).	
104	1920	The Ganeshkhind Botanical Garden, Kirkee (Its Genesis and Development)	0 15 6
105	1920	The Groundnut Bug and its Control	0 2 0
106	1920	Dharwar American Cotton: Its History, Cultivation and Improvement	0 7 0
107	1921	Gonag—a Weed in Drilled Paddy	0 5 0
108	1921	Summary of the work done on Jalgaon Farm	0 5 6
		Do. do. do. (Marathi)	
110	1922	Year Book of the Agricultural Department in the Southern Division	0 5 0
111	1923	A Note on Well Boring	0 8 0
113	1923	Year Book of the Agricultural Department in Sind Division ...	0 8 6
114	1923	Studies on the Rice Plant and on Rice Cultivation	0 13 0
115	1924	Shevri as a Fodder Crop	0 3 0
116	1924	Sugar Industry in Western India and Methods of Sugar Manufacture	1 2 0
117	1924	Investigations in Fig Culture and Treatment	0 5 6
118	1924	Land Crabs as Agricultural Pests in Western India... ...	0 8 0
119	1924	Year Book of the Agricultural Department in Southern Division, 1924	0 4 6
120	1924	Silage for Fodder in Western India	0 4 0
121	1924	Further Investigation on Potato	0 6 0

No.	Year	Subject	Price Rs. a. p.
72	(Revised 1925)	Experiments with the Automatic Water Finder in the Trap Region of Western India	0 4 0
122	1925	Sugarcane Varieties of Bombay Presidency, India	0 2 6
123	1925	Ridge Cultivation in Lower Gujarat	0 8 0
124	1925	The Chemical Composition of Food-grain Vegetables and Fruits of Western India	0 3 6
125	1925	Some of the promising exotic Sugarcane varieties of the Manjri Farm	0 13 0
126	1925	The Bhagnari Breed of Cattle in Sind and Baluchistan ...	0 6 0
127	1926	Elephant Grass—a new and useful Fodder Crop in Western India	0 1 0
128	1926	Cotton Cultivation in Sind	0 3 0
129	1926	The treatment of patches of Inferior Tobacco in Northern Gujarat	0 1 6
130	1926	Some useful forest Trees and Shrubs of the Coastal Tract and their fodder value	0 8 0
131	1926	The Fig Industry of Asia Minor	0 4 6
132	1926	The Improvement of Tobacco in Northern Gujarat	0 4 0
133	1926	Work of the Ganeshkhind Botanical Gardens and Modibag Garden in 1921-25	0 2 0
134	1927	Murrah Buffaloes in Sind	0 2 6
135	1927	An improved method of growing Turmeric in the Deccan ...	0 4 0
136	1927	Cattle Breeding in the Bombay Presidency, Principles and Progress	0 5 6
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